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"Let There Be Sight"

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LEWIS H. CARRIS, *Editor*
ISOBEL JANOWICH, *Managing Editor*

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Eye Openers

Emanuel Krimsky, M.D.

EVERY doctor will recognize in this article questions which have been presented to him by patients in the course of his medical experience

NOTHING interests people more than a knowledge of the whys and wherefores of their own ailments; also close in their interests are the whats and hows of the ailments of their children, husbands and wives, relatives and friends. An effort has been made to assemble and answer some of the more common questions that the eye physician is asked by patients and their relatives.

Is There Danger of Eye Glasses Breaking and Causing Injury to the Eyes?

However possible such an accident might seem, strangely enough, it very rarely occurs. Many busy eye specialists have never observed such a misfortune. And the reason is not difficult to understand. Those who wear glasses instinctively value their eyes more than those who do not, and the slightest shock or fear will automatically bring a sudden closure of the lids with concomitant protection to the eyes. For those who are not reassured, it is a comfort to know that lenses may now be obtained which are made of non-shatterable glass. This being the case, it is quite needless for a mother to deny her young child the safe glasses.

Will I Always Have to Wear Glasses?

Those who really need glasses will probably always require them, and by trying to deny themselves such a necessity, they are merely postponing the use of a comfortable aid to vision to some

later date. More glasses are being worn now than in the past, not because eyes are more defective—for they are not—but because the modern human has applied himself to occupations requiring close vision, unlike the pursuits of his forebears who lived on the soil where close use of the eyes was seldom called into play.

While eyes should be re-examined about once a year for glasses, and oftener in cases where eyes change more rapidly, it does not necessarily follow that lenses must be changed. For, while in some persons annual or biennial changes of glasses may be required, in others the same lenses may serve faithfully for ten or fifteen years.

Not every person can be equally benefited by glasses. The eye trouble may be severe eyestrain reflecting a general bodily disease; or it may indicate one of the many diseases which attack the eye. Such a determination falls within the realm of the ophthalmologist. The need for frequent changes of glasses may point to something far more serious than refractive error. Diabetes is frequently responsible; or it may be kidney trouble, or hysteria, or some other ailment. The important point is that the remedy lies in looking for the source of the trouble.

Another question ophthalmologists often hear, is: "Will I outgrow the need of glasses?" Such a liberation does occur, not as a result of wearing glasses, but in spite of their use. It would have just as readily occurred if these persons had religiously shunned glasses when they really needed them. The need for glasses is based on deviation in the size or shape of the eyeball from the normal.

The question of tinted glasses for everyday use is one that has raised many controversies. While in a few instances such lenses may be recommended because of excessive sensitiveness to light of average intensity, they are quite objectionable to normal eyes because of the unnatural color stimulation they introduce.

Is Pus in the Eyes Dangerous?

One of the common afflictions of the eyes is pus discharge. It is probably correct to state that at some time in every person's life such a condition will have occurred. And yet one significant fact is often overlooked, namely, in not a few instances pus containing dangerous organisms may cause blindness. From the moment a

child is born, every doctor and every nurse is on the watch for this disturbing complication. Since the routine instillation of antiseptic drops in the eyes of every newborn infant has become a standing rule, it has become almost axiomatic that blindness from discharge in the eyes of the newborn is due to sheer neglect. The doctor who thinks of pus also thinks of germs and of a microscopic examination. Gonorrhea, for example, is extremely dangerous to the eyes, yet its discharge may look no more harmful than that occurring with ordinary "pink eye." It is not the discharge of pus which blinds, but the organisms, whose identification should be left to the trained eye doctor. Pus in the corners of the eyes is a very common disturbance among adults, and can be successfully treated.

Are Tobacco and Alcohol Injurious to the Sight?

As a rule, neither tobacco nor alcohol directly affect the eyes, unless they have first attacked the general health. And yet every eye specialist, and every book on eye diseases, give prominent mention to blindness of varying degrees of severity from the prolonged and excessive use of either tobacco or alcohol in certain susceptible persons. It is extremely important to recognize blindness from tobacco or alcohol because immediate and complete abstention will often restore vision, unless the case has progressed too far. Wood alcohol blindness is permanent and cannot be cured.

Are Circles Under the Eyes a Sign of Eye Trouble?

The eye specialist is not infrequently consulted to correct a worrisome darkening of the lower lids. Rarely, however, can such a condition be traced to poor sight or diseased eyes. From the standpoint of the physician, the best that can be said is that certain persons are so constituted that the veins underneath the skin have become more apparent because of too little fat in the skin to conceal them; or possibly there may be too much skin pigment. Of themselves, the circles mean nothing. If the family doctor has assured the patient that she is not anemic, that her eyes are healthy, and that her general physical condition is good, then she had better stop thinking about this variety of rings.

Is a Black Eye Serious?

Among children—and sometimes among our alcoholic brethren—a black eye is regarded with honor, in the same sense that German students honor a scar on the cheek as evidence of duelistic prowess. If such an outward discoloration represented the whole story, we might have reason to laugh it away. But the inexperienced can see only skin-deep. It may be that the large majority of these cases can well survive the ordeal, even without having to go to a doctor. But that a certain number of these black eyes also show, on more careful examination, either a fracture of the skull or a hemorrhage into the eyeball with almost sudden blindness, is not generally known. It would seem reasonable, therefore, to submit all these eye injuries to medical examination, to avoid any possibility of permanent harm.

What Causes "Pop Eyes"?

Abnormally prominent eyes do not indicate larger eyes than normal, but are caused by an outward pushing of the eyes from their sockets. The doctor observing such a disturbance thinks of various possibilities. While prominent eyes most often mean thyroid gland disease, the condition may also be due to a tumor or growth in the socket (orbital cavity). Or it may be due to pus or blood filling up this cavity and pressing the eyeball forward. The determination of the exact cause for this condition is of paramount importance so far as the eyes and general health are concerned.

Can You Correct a Drooping Lid?

Like other disturbances of the eye, the mere existence of such an anomaly is of only passing interest. To trace its cause is our problem, for then we are in a position to institute proper treatment. If it be due to syphilis, as it occasionally is, then treatment will often yield surprisingly good results. If the lid muscles require operation, we may here, too, expect beneficial effects. In other instances, the muscles of the lids may be so wasted that the person may find it impossible to see because the drooped lids cover the pupils. Even in such apparently hopeless cases, a novel device known as a crutch spectacle will hold up the lid and belie the cosmetic defect.

What Do Puffy Lids Mean?

The eye doctor is often consulted for puffy lids. Just as swollen legs may require a heart specialist rather than a foot doctor, so puffy lids are not as a rule indicative of eye trouble, but of some disorder which the family doctor should aim to discover before the patient decides to see the eye doctor. It may in one case be due to a harmless form of exaggerated hives, or a bee sting; or in another instance, to heart or kidney trouble. The want of blood may in some persons account for such a puffiness.

What Can Be Done About Styes?

Styes are annoying and often obstinate, for no sooner is one gone than another one may appear; and sometimes, in spite of what the doctor may do, they keep on reappearing like weeds in a garden. For all that, they are quite harmless. Styes can be helped, partly by the doctor and partly by improving the patient's system. Measures must be taken to prevent the pus from spreading to other eyelashes. Hence washing the eyes is forbidden. Proper antiseptic salves should be prescribed to counteract the existing infection; and the possibility of a run-down state or of some bodily disease, such as diabetes, should not be ignored.

Is Common Granulation of the Lids Dangerous?

Granulation of the lids is an annoying eye affection. It is popularly associated with a reddening or scaliness of the lid margins and often indicates a run-down condition, or a dietetic or skin disorder. In any case, it is never serious and can usually be easily corrected—provided the patient is willing to seek medical attention. Too often, the condition is neglected.

Among eye specialists, the term "granulated lids" may convey entirely different meaning—something more serious, but fortunately increasingly rare in the United States. I am referring to trachoma—a chronic disease of the lids often leading to blindness when untreated.

What Are Running Eyes?

We never think of the surface of the eye as being moist until actual tearing occurs. Normally, tears are pouring into every eye

from a gland, known as the lachrymal gland, situated beneath the upper outer eyelid. Were it not for the fact that this procession of tear drops automatically finds its way into the nose via a little opening on the lower inner lid leading into the connecting passage (lachrymal duct), tearing would become quite obstinate and annoying. The best proof of the patency of this passage is that when a person cries he often holds his handkerchief to his nose, really to wipe away the excess of tear drops which have escaped into the nose. When a person presents himself to the doctor for excess tearing, the latter makes sure that there is no clogging in any portion of this passage. In some instances, this connecting duct may be so clogged that the tears stagnate and produce a swollen abscess below the lower inner lid. When stretching of the duct is feasible, that is performed. In other instances, the duct may be too damaged to be saved, and this infected, swollen sac has to be removed—an operation that is not disfiguring or harmful in any way. In still other cases, the gland or source of the tears may be overproductive, and part of it must be removed. And in still other cases, it may be just a particle of dust in the eye that is causing all this trouble, or just a simple catarrh of the lids requiring proper medication.

What Do Spots Before the Eyes Signify?

When we find spots on a perfectly white illuminated screen, we naturally look for dust or specks in the projector. And if floating particles or spots are seen or projected by the human eye, we likewise look for particles which can often be clearly recognized by the eye examiner in some portion of the eye. In other instances, the "spots" in the visual field may be just as real and yet there may be no particles in the eye whatsoever because the condition is due to some disease in the eye, such as arteriosclerosis; or to no disease at all, but to a simple nervous disorder. The establishment of the cause is quite important for the patient, not only from the standpoint of preservation of vision, but also in giving one warning of a possible existing or oncoming bodily disorder. The average layman does not realize that the eye is often a mirror of bodily disorders, and that the competent eye physician always finds in an eye ailment the reflection of some other possible bodily disorder.

Does Eyestrain Cause Blindness?

What do we mean by eyestrain? If by eyestrain is meant excessive use of the eyes for reading, then no one can prove that even partial blindness can result from it. The only thing we can expect is a tired feeling in the eyes, and reddened lids. Nor are we to make the mistake of attributing eyestrain to the wearing of thick glasses, or to excessive use of the eyes, for if you will scan the reading public, you will find prolific readers who have never found need for glasses, and others who read little and still require periodic changes of their glasses. There is a form of eyestrain or eye fatigue due to an impaired state of health. Obviously, no glasses will fully correct such a disorder; a general toning-up of the system, with rest to the eyes, is the answer. Cross-eyes are sometimes confused with eyestrain. In fact, it is a common superstition to guard young children from performing funny gymnastics for fear that they may become eyestrained or cross-eyed. Here, too, clear proof is lacking. The term "eyestrain" is very rarely used among eye specialists, who aim to classify the very many eye disorders—all of which in reality must represent some strain to the eyes—into intelligible ailments.

Do Children Outgrow Cross-Eyes?

Cross-eyes is another eye disorder that is often laughed away by friends and neighbors and, I am afraid, by many parents, too. Some parents seek solace in the common superstition that their children will outgrow the cross-eyes, never realizing that a crossed eye may be a blind eye, for the reason that two eyes cannot see at the same time when they are not straight and one eye therefore becomes visually impaired in order to avoid disturbing double vision. That eye often gradually loses vision from disuse or inaction.

Another mistake parents make is to defer examination or treatment until the child is too old. Early attention is absolutely imperative, for the young child acquires his habits and incidentally adjusts his unstable eyes at this early period. Just as children must be broken of wrong habits when they are very young, so must their eyes be properly trained and cared for at this stage. Among eye doctors it is axiomatic that the younger the child, the more

certain the success; after the age of eight or nine, restoration of vision is difficult.

The management of cross-eyes is far different from the routine attention to other eye ailments, when it is primarily a case of drops or of surgery for which the eye doctor assumes full credit for success. Correction of cross-eyes is a process in education in which the full co-operation of the parents and the child is demanded in order to train the eyes into their normal position. The doctor is merely a supervisor or teacher who keeps a close watch on the homework of parent and child, and either assigns progressive training, or must decide whether surgery must be resorted to. A piano student can hardly become a finished pianist if all his training is done only during the course of a piano lesson. As in the case of the piano student, whose teacher cannot at once judge how promising his pupil will prove to be, so is it with eye training. Supervision must be patient and exhaustive and individual and fascinating; with such a course of procedure some children will prove promising, others will not. But no harm can be done, and surgery may well be postponed during this trial period.

What Can Be Done to Remove Particles from the Eye?

When something falls into the eye, we naturally rush to the corner druggist, for he has attended to these accidents when we were children, and possibly from time immemorial. It seems too trivial a disturbance to warrant an eye doctor. Besides, it would entail needless expense. And, as a rule, the druggist is successful; if he is not, the only one who would know that would be ourselves, for we should never rebuke a friend whose assistance was gratuitous. In spite of what I shall have to say, the corner druggist will probably continue wiping away dust particles from the eyes.

Can you picture a piece of coal or iron dust, not lodging on the lid, but becoming fastened onto the eyeball? Try to imagine a well-meaning druggist, without lens or light or equipment or sterile material, trying to rub a cotton applicator back and forth on the surface of a delicate eyeball, and possibly scratching it. Imagine the nervous patient moving his head and incidentally his eyeball against this applicator. I need not enlarge on this picture. And if you are still a confirmed believer in the druggist,

and have been relieved of a particle of dust, are you certain that there may not be another particle in the eye, as sometimes happens? Or it may be that a piece of iron may be unkind to you, and choose not to rest on the lid or eyeball, but to penetrate the eye without leaving any outward marks, as sometimes happens. This can be detected only by means of an X-ray picture. Wherever the foreign body may be, haste is imperative, for an eye cannot survive the invasion of an unfriendly visitor without suffering severely sooner or later. Not only that, but the unharmed eye may also suffer quite as severely as the injured one, out of sympathy for its fellow. Can you see how important it is to see what you are doing, especially when dealing with such a delicate organ as the eye? If the piece of iron is fastened on the eyeball, the eye must be anesthetized, and its removal must be painless and gentle; if it has perforated the eyeball, an electro-magnet will probably be needed, or complete loss of the eye may result. Thus it is easy to see how important it is that an eye physician be consulted from the very beginning.

What Is Glaucoma?

Glaucoma is one of the eye specialist's most serious problems. Other eye ailments may appear too obvious to an experienced physician, or may last a few days and be forgotten, or even if serious, may not lead to such suspense and lingering and alarm as dread glaucoma. Its gravity is enhanced when we realize that it may progress to complete blindness in spite of the most expert medical or surgical treatment. Neglect of the condition, however, hastens blindness which might otherwise have been completely checked, or slowed in its downhill progress.

Glaucoma is an abnormally increased hardening of the eyeball, brought about when the fluid, normally circulating in the eyeball, becomes blocked and imprisoned, and cannot escape. Hence, there results a congestion in the eyeball that mounts as more fluid seeps into it, until it would seem as though the eyeball would burst from this intense pressure. While such a rupture does not, as a rule, occur, the damage to the optic nerve and retina from this pressure may be severe, and the pain, even in the early cases, is bursting in character.

How does the doctor tell that an eyeball is hard or under pressure? If the case is marked, or even moderate, his fingers will not deceive him. If it is mild or early, an instrument (tonometer) applied to the eyeball will not only indicate a condition of hardness, but will also yield the exact pressure for record purposes. Other technical methods are also resorted to.

The tragic aspect of the situation is that the patient with early glaucoma never thinks about his eyes; his complaint is usually severe headache, one for which a druggist's medicine or an examination by the family physician would appear sufficient. What a common complaint—headache. If the patient were fortunate enough to have his doctor discover the existence of early glaucoma, when damage to the eye is still insignificant, how thankful he should be; for it is in just these early cases, which demand the most careful detection, that the greatest good may be expected. The treatment consists in giving something which will re-open the microscopically fine passages in the eyeball, and flush out the clogged fluid, thereby reducing the hardness. Certain eyedrops, under the careful control of the eye doctor, are often successful. In other cases, an operation is required.

However wonderful have been the advances in ameliorating this condition, and in understanding its structural nature, the real cause is still a mystery. For that reason, every case of glaucoma offers a distinctly individual problem. Whatever the nature of glaucoma, be it mild or severe, it cannot be too strongly emphasized that even though the patient may never again require any further treatment, he should regard himself as a chronic case in the sense of requiring periodic examination by his eye doctor.

What Can Be Done for Cataract?

Cataracts are loosely taken to mean any and all reasons for fogging or dimness of vision. While the fogging of almost any portion of the eye may lead to blurred sight, only one form can, strictly speaking, be considered "cataract"—the one due to fogginess of the lens of the eye. For the layman, such a distinction is especially important for the reason that the lens is particularly accessible for surgical operation, whereas other types of foggy vision either are amenable to some other form of treatment, or may not be helped at all.

Cataract is not so simple as it sounds, because its nature may forbid surgery. Then, again, whatever the ultimate outcome of a cataractous eye, its progress must be repeatedly observed while waiting for the ripe or mature stage to develop in order that the knife may do its intended good. Eye drops and various injections and even vitamin-containing oils have been recommended by some doctors as promising, but the real proof as to their intrinsic merit is still lacking. Cataracts do not develop uniformly, but vary much in the way they progress: some remain at a standstill in slight form for many years; others become rapidly mature; and still others clear up of themselves. And, finally, however ripe and ready for operation a cataract may be, a doctor may still hesitate to undertake surgery out of respect for the fellow eye which may prefer a fogged partner to one in which restoration of vision may have induced annoying discrepancies in the acuity of sight of the two eyes; or it may be that there is some underlying disease such as diabetes or syphilis where complications may be feared. And so, like glaucoma, the management of cataract is an individual problem but one which in properly selected cases offers an amazing measure of success and gratification.

Illumination Intensities for Reading*

Miles A. Tinker, Ph.D.

THIS is the second of a series of articles on illumination which the REVIEW is presenting to meet the inquiries of ophthalmologists, school officials, business and factory directors, and parents as to the problems of lighting

THE ordinary citizen is being made more and more conscious of the illumination brightness under which he uses his eyes both while working and in recreational activities. We find a wide divergence in the intensities of artificial light which are being recommended as most hygienic for the eye. It would seem, therefore, that this is an opportune time to make a critical analysis of the experimental data from which the conclusions concerning hygienic illumination intensities are derived. Perhaps the data are more consistent than the conclusions derived from them.

Reading is perhaps the most common form of visual work done under artificial lighting. Our discussion, therefore, will be concerned with the experimental foundations of hygienic illumination intensities for reading.[1]

The many experiments on the relation of visual acuity to intensity of illumination all yield highly consistent results.[2] The increase in visual acuity with rise in light intensity is very rapid from a fraction of one foot-candle up to about five foot-candles.† With further rises in intensity, visual acuity increases more and more slowly. Beyond 10 or 12 foot-candles the increases in acuity

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† A foot-candle is the brightness of light from a standard candle one foot away. For example, a 60-watt frosted bulb with the rounded end projecting toward the reading surface will yield 10 foot-candles of light at approximately 37 inches distance, 15 foot-candles at approximately 31 inches distance and 25 foot-candles at approximately 21 inches. If the lamp shade reflects some of the light downward the brightness at any given distance will be somewhat increased.

are hardly noticeable and beyond 20 foot-candles they have no practical significance.

The measurement of visual acuity involves, of course, discrimination of very fine details. The results of these studies, therefore, are ordinarily not readily applicable to the normal reading situation. Experiments which do pertain directly to the hygiene of reading are investigations of the relation of illumination intensity to visual fatigue and to efficiency of visual performance. It has been shown[1] that the decrease in ability to sustain clear seeing (fatigue) during continuous reading for three hours under well-diffused artificial illumination was marked when the light was one foot-candle or less, but at three foot-candles the ability to maintain clear seeing was as efficient as at higher intensities; that is, there was practically no change in visual fatigue at three foot-candles and over. When Atkins[3] increased the intensities of diffused lights by steps from 9.6 to 118 foot-candles there was no change in working efficiency in a short number-work test. Extensive investigations of the illumination in U. S. post offices[4] revealed that efficiency of letter sorting reached its maximum only when the light measured at least eight to ten foot-candles. Increases in efficiency were large when the illumination was varied from two to five foot-candles but only slight when varied from five to eight or ten foot-candles.

Luckiesh and Moss[5] performed an experiment which they call the most significant research so far reported in the invasion of the realm of psychophysiological effects of seeing and which they claim is mainly responsible for establishing a "new science of lighting."[6] They measured in grams the pressure changes in muscular tension at the finger tips while normal subjects read large (12 point) type under 1, 10, and 100 foot-candles of light. The mean pressures were found to be 63.2 grams for 1 foot-candle, 54.1 grams for 10 foot-candles and 43.0 grams for 100 foot-candles. Plotted on a logarithmic scale the differences between means *appear* large. No significant change in rate of reading appeared under the different intensities. From the data in this experiment the authors claim that "at least several hundred foot-candles would be the best intensity of illumination for this task which could be performed in full moonlight."[6]

A careful examination of the data in this experiment suggests

that the conclusions are not supported by the results. Tinker[7] points out that the data should be plotted on a linear rather than on a logarithmic scale. The results then show marked changes in pressure up to five or six foot-candles; gradual changes from six to eight or ten foot-candles, very small changes from 11 to about 25 foot-candles and practically no significant change thereafter. It seems obvious that all of the important changes in muscular tension occurred at relatively low illumination intensities. In fact, the revised curve for the data is very similar to curves expressing the relation between visual acuity and illumination intensities and no one has concluded from these that high intensities are desirable for reading. We are forced to reject Luckiesh and Moss's interpretation that slight changes in muscular tension at the higher intensity levels indicate that several hundred foot-candles are best for reading large black print on white paper.

The reader's choice of the brightness of light which he considers most comfortable for reading is held to be important. With well-diffused light, Luckiesh, Taylor, and Simden[8] found that the average reader preferred 5.3 foot-candles for reading text in 11- and 12-point type (large book type), and 10.6 to 16.1 foot-candles for text in 9-point type. For 9-point type of very poor legibility only 17.4 foot-candles were chosen when 30 were available. Somewhat later Luckiesh and Taylor[9] measured preferences for light intensities when subjects read text in 9-point type under well-diffused light. When 8 foot-candles were available the readers chose 4.2 as most comfortable; with 30, 10.6; with 45, 16.1; with 65, 23.2; and with 100, 35.8. That is, from one-third to one-half of the available intensity was chosen as most comfortable. In a more recent study Luckiesh and Moss[6] found that the median intensity chosen was 50 when up to 1,000 foot-candles were available. Why were higher intensities not chosen when they were available? It would seem that the adaptation of the eye is involved. Apparently the eye readily adapts itself to easy and efficient seeing at various intensities of illumination above a certain minimum. For ordinary reading by the normal eye this minimum seems to be approximately three foot-candles. Thus when the eye is subjected to a wide range of intensities the adaptation is apparently such that only a fraction of the available brightness is chosen as most com-

fortable for reading. Since the range of intensities available in most homes and offices is probably not less than eight and not more than 30 foot-candles, 4.2 to 10.6 foot-candles may be taken as representative values for preferred light intensities in these situations. Contrary to Luckiesh and Moss's statements[6] there is nothing in the literature to support the notion that the normal person reads with greater comfort under relatively high intensities of illumination.

There are situations, however, where high intensities of light are essential for hygienic vision: (1) the defective eye, even with corrective lenses, needs a brighter light than the normal eye. In like manner, the eye that is changing with age should work under relatively bright illumination. Ferree, Rand, and Lewis[10] found that normal eyes are little benefited by intensities above 10 foot-candles but that persons with presbyopic vision are greatly aided by intensities up to 100 foot-candles. Similarly it was found that increased light intensities improved near-point vision of presbyopic eyes but not nonpresbyopic eyes.[11] Probably intensity of light as well as correcting glasses should be kept in mind as one of the aids in presbyopia. (2) When print is of poor legibility or when discrimination of very fine details is required, light intensities should be relatively high.

It is well known that the relation between intensity and distribution of light in any seeing situation is extremely important.[1] If the illumination is uniformly diffused, the intensity may be increased to any desired level without harm to the eyes, but where the light is not well diffused, the higher intensities result in glare which frequently produces marked eyestrain. With the most uniform diffusion found in the average home or office it is probable that the light intensity should not be greater than about 15 foot-candles. Ferree and Rand[12] have devised a type of light unit which yields hygienic, glareless illumination with a wide range of intensities.

In the light of experimental data on the requirements of efficient and comfortable seeing, the following specifications for light intensities should fulfil the requirements of hygienic vision for the reading of legible print by the normal eye: three to five foot-candles with direct lighting and poor diffusion; five to ten foot-candles

with the combinations of direct and semi-indirect illumination frequently found in homes and offices; 10 to 15 foot-candles with the better degrees of diffusion found in a few homes and offices. If glare is eliminated, higher intensities may be employed without harm, but also without practical advantage. As specified above, for defective eyes, for the reading of illegible print, and for discrimination of fine details, light intensities should be much higher. Eyestrain will not be avoided, however, unless the light is adequately diffused at these higher intensities.

A survey of the evidence leads to the conclusion that there is nothing to justify the suggestion that 25 to several hundred foot-candles of light are essential for easy and efficient reading of legible print by those with normal vision. The data indicate that relatively low intensities are entirely satisfactory. In fact, if eyestrain is to be avoided, low intensities are necessary in situations where the diffusion of light is poor.

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Heredity in Relation to the Eye

Prof. H. Lauber

THE eye may be considered one of the best sites in which to study transmission of anatomical structure, physiology, and pathology from generation to generation

HEREDITY, a force determining and governing every living thing, including man, is one of the most obvious facts in nature. So it cannot be surprising that the eye is also subjected to it, just as other parts of the body are. The possibility, however, of very exact measurement and examination of almost all parts of the living eye enables the scientist to observe the force and pattern of heredity in so many respects that the eye may be considered as one of the best sites in which to study transmission of anatomical structure, physiological action, and pathology, from generation to generation.

A casual observer will notice that the color of the eyes is generally inherited from either one of the parents or from some more remote ancestor. Sometimes one finds that one eye has the color of the father's eyes, and the other the color of the mother's. On closer investigation, we frequently discover in the anatomical structure of the eye features found in the eye structure of one of the parents. The radius of curvature of the cornea and its irregularities are often repeated in the child with extraordinary neatness. The same applies to the diameter of the cornea and to the length of the globe. In consequence refraction is, to a large degree, determined by hereditary factors. This applies particularly to high myopia, a condition which may exist at birth and is apt to progress during the whole period of growth. Such conditions can be studied, especially with regard to the pathology of the eye. We almost all of us know families with numerous cases of short-sightedness.

Life-Span of Eye Inheritable

Cataract is another disease of the eye which seems to run in families. Cataract is an affection developing chiefly in old age, and must be considered as a sign of local senility. The term *local* senility is deliberately applied here because attentive observation shows that changes caused by old age may be very different in character, and certain changes may exist by themselves without any other symptoms. Such isolated signs of senility are extremely pronounced in certain families: in one, baldheadedness is a usual thing in old age, whereas members of other families have good heads of hair all their lives and even in very advanced years; in some instances, all members of a family grow grey comparatively young, but they do not lose their hair. Then, again, we witness the early loss of teeth as a family characteristic. These well-known facts prove that different parts of the organism may be especially liable to decay—we might say to local death—before the entire organism shows pronounced signs of a decline caused by age. Everybody knows that there exist longlived families, while in other families hardly anyone reaches the age of sixty. Just as the entire individual may be shortlived or longlived, so single parts of the organism can die early or survive very long. Shortlivedness may affect a part of the body not essential to life, as the eye.

One may observe in the eye local destructions due not to external influences, but to an innate disposition which develops at a certain period of life. Ophthalmologists are familiar, for instance, with the degeneration of visual cells in the macula, the part of the retina with which we see best and on which we try to focus any object we want to see distinctly. The destruction of this part of the retina makes reading impossible and diminishes the eyesight so considerably that it cannot pass unnoticed. Such a degeneration may appear at any age and frequently affects several members of the same family. The interesting fact is that it affects the members of the same family at the same age, which differs from family to family. The degeneration may set in before the age of 20 in one family, or between the ages of 40 and 50 in another; it may occur in some families only as a pronounced sign of senility. The disease is not rare in old age, but it has a tendency to appear

in several or even all members of a family at approximately the same age. These facts teach us that a certain group of cells in the eye possesses the faculty of living for a certain period of years, and of dying at a certain age. When the destruction of these cells takes place in old age, we are not surprised because we are used to seeing degeneration of different parts of an organism worn out by long use. Our attention is more frequently called to such defects when they occur at a comparatively early stage of life in otherwise apparently healthy persons.

Sex-Linked Diseases of the Eye

This tendency is not unique in the study of diseases of the eye. The German oculist, Leber, described a partial atrophy of the optic nerve which appears at a certain age in all or most males of a family, exceptionally also affecting females. Here, again, certain nerve cells degenerate at a given age: another case of local death.

There is also a congenital condition, color blindness, which is hereditary. It mainly affects males and is often passed on by healthy females to their sons. The transmission of color blindness has especially been studied: it is congenital and does not alter during life.

A very dangerous affection of the eye, glaucoma, is sometimes seen in several members of the same family, who tell us that in the preceding generation, or sometimes even in two or three preceding generations, glaucoma was common. Here it is not the affection of a small group of cells, but a disease condition extending to the entire eye, and most probably even beyond, though the symptoms are located in the eye. We know that the cases of glaucoma in the same family resemble each other very closely, a fact quite important for the physician in the treatment of the individual case.

Forewarned—Forearmed

Though by no means have all hereditary conditions of the eye been enumerated—on the contrary, only a few examples have been given—one may draw very interesting conclusions from them. We see that anatomical structure and physiological function are based upon heredity; consequently, disease conditions rest upon the same foundations. The knowledge of the affections and their

course in people related to the patient can form a very important indication for the physician. He will be on the look-out for developments in the course of an affection similar to those known from the history of other members of the same family. He may, therefore, apply preventive treatment in order to influence the condition favorably at its very outbreak. Predestination is met with in nature perhaps more frequently than we realize. One must, however, not become fatalist and conclude that it is unnecessary or hopeless to undertake the treatment of a hereditary affection. Because treatment of the patient can be started before he has reached the age in which his vital powers are exhausted, knowledge of the family history will even allow us to hope for recovery from severe diseases. Sometimes we see quite old people recover remarkably well from very serious and dangerous illnesses—their vital powers were sufficient to overcome the disease; on the other hand, one sees conditions, not generally considered dangerous, prove fatal to comparatively young persons. May it be well understood that the fact alone of belonging to a longlived, healthy family does not give one the license of trifling with one's health in a foolhardy way. By undermining it by unhygienic habits, (such as drinking, smoking and so on) and thus causing wilful injury, one can destroy even the soundest constitution. Predestination to long life will prove true only if life is not injured by too powerful counteraction. It is also very probable that members of short-lived families will live longer than the medium age if they comply with the rules of hygiene and live a healthy, active life. Early control of hereditary affections of the eye can, by systematic treatment, in many cases overcome disease tendencies and prevent or at least delay their progress.

Besides downright affections, there also exist congenital malformations of the eye connected with blindness or poor sight. The number of these cases is not large. Far more numerous are people afflicted with hereditary eye disease, for instance, high myopia which predisposes to severe ocular affections, such as degeneration of the macula or detachment of the retina. The condition of the eyes is, therefore, as far as transmission of diseases and predisposition to them is concerned, of great importance, as well from the individual as from the social point of view.

Squints and Squint Training*

James H. Allen, M.D.

TO correct cross-eyes treatment must be begun early and followed consistently

THE term squint is used to designate any of those conditions in which an individual's eyes are not straight. It may, therefore, refer to those cases in which a patient's eye may be turned up or down while the other eye remains straight, or to those in which one eye turns out while the other remains straight, as well as to those cases in which the eyes are crossed. For purposes of differentiating between the two eyes, the eye that remains straight is called the fixing eye and the eye that is not straight is called the deviating or squinting eye.

There are several types of squints, for instance that type due to paralysis of one or more of the muscles which control the movements of the eyes. This type of squint may appear any time during life as the result of injury or disease and forms only a small percentage of this affliction. There is another type, which is the result of disease or injury of the eyeball itself, producing a marked loss of vision or blindness, and, as the patient can no longer make use of this eye, he does not attempt to control its movements. This group, likewise, forms only a small percentage of the entire group of squints. The great majority of squints occur in childhood, making their appearance between the ages of one and six years, with the largest number of them developing before the age of four years. Thus, they occur at that period before the eyes have reached their full development, and arise as a result of faulty development. It is this group that we shall consider today, for it is this type which offers the best results from proper treatment.

* Address given before Public Health Section, Iowa State Association of Registered Nurses, at Davenport, Iowa, October 16, 1935, and reprinted with permission from *Public Health Nursing*, February, 1936.

The importance of treatment of this group of squints is found in the fact that the deviating eye rapidly loses vision and becomes blind when neglected. To remedy unattractive appearance and the prevention of the development of peculiar psychological reactions, such as an inferiority complex, are of secondary importance to the conservation of sight.

In order better to understand the mechanism of the development of this type of squint and the rationale of its treatment, let us consider normal eyes.

The Normal Eye

A normal adult uses both eyes all of the time in order to ascertain the position of various objects in space, and the relative distances between objects; in other words, he has a sense of perspective. He has this sense of perspective because, in looking at a particular object, he sees a slightly different portion of that object with each eye, or we may say that a slightly different image of the object is formed in each eye. Then the impressions of these images are carried to the brain separately for each eye, but the brain blends the two impressions into one picture thus producing binocular vision and depth perception. This ability of the brain to blend the two images into one picture is called the fusion faculty. We may say that binocular vision is dependent upon the presence of a fusion faculty, but in addition to this, the eyes and muscles which control the movements of the eyes must be normal.

At birth the fusion faculty is not present even in the normal infant. It is only at the age of about five or six months that one first finds any evidence of the beginning development of this sense, and it is not until about the end of the first year that the infant shows a fairly marked development of the fusion sense, or a fixed desire for binocular vision. During the first six months of life his eye movements, like most of his other acts, are purely reflex, and although the eyes move together to a certain extent, these movements are uncertain. During the second six months of his life the infant begins to use his eyes together, that is, he begins to look at objects with both eyes at the same time. At first he can focus both eyes on a single object only momentarily, but towards the end of the first year he will make a considerable effort to focus

both of his eyes on a single object, which means that he is showing a desire for binocular vision under the influence of the developing fusion sense. However, from a large amount of experimental data it has been concluded that the fusion faculty does not reach its full development until about the end of the sixth year of life.

The Abnormal Case

With this normal mechanism in mind, let us suppose we have an individual who has not developed a fusion sense, or whose brain is not capable of fusing the images of an object formed in each eye. This individual will then see double as long as he looks at an object with both eyes at the same time. In order to avoid this confusing state of affairs, he looks at an object with one eye and allows the other eye to turn away. This is probably the thing that happens when a child first begins to squint. We can say then, that the primary cause of the great majority of squints is the absence or failure of complete development of a fusion sense, for some squint patients do show some evidence of having a fusion faculty, but in these cases it is very weakly developed.

In the presence of this fundamental cause the eyes are in a state of unstable equilibrium ready to squint either inwards or outwards on slight provocation. This provocation may be supplied by any one of several secondary factors, the most important of which is poor vision in either one or both eyes. If the patient has good vision in one eye, he will look at an object with this good eye and allow the other eye to deviate. If the vision of both eyes is poor, the patient will fix with the eye that has the better vision and allow the other eye to deviate. Other secondary causes of squint are injury during birth, hereditary influences, and occasionally childhood diseases. Even though we frequently hear parents say that their child began to squint when he was getting over measles, we find that the primary cause, even in these cases, is a poor or undeveloped fusion sense. The child, in addition to that, nearly always has poor vision and during his convalescence he was given picture books to look at with the result that in his general weakened state he was unable to focus both eyes on the pictures, and so made use of the one eye with which he could see with the least effort, allowing the other eye to deviate.

In addition to provoking the appearance of a squint, the secondary factors generally determine the direction in which the deviating eye will turn. For instance, if poor vision is the provocative cause of the squint, the deviating eye will practically always turn inwards if the patient is farsighted. If the patient is nearsighted the deviating eye will, in most cases, turn outwards. Of these two causes of poor vision, farsightedness is, by far, the most common. Therefore, we would expect the majority of the squints to be convergent or have their eyes turned inwards. This is borne out by a recent survey of grammar school children in which 10,239 children were examined, and 253 were found to have squints. Of this number, only 22 children had eyes that turned out while in 231 cases the eyes turned in.

In order to understand better the importance of treatment of squint conditions, and particularly the importance of early treatment, let us follow the course of a typical untreated case. This hypothetical case, for which any number of examples may be found, has a poorly developed fusion sense, let us say, and is farsighted. During the first six months of his life the patient's eyes remain relatively straight from reflex movements. During the next six months he begins to develop a fusion sense and this keeps his eyes relatively straight during this period; although at times it may be noticed that one eye will turn in for a few moments at a time. During the second and third year of his life, he begins to take an increasing interest in objects that are near to him, such as picture books. These objects require the child to focus his eyes, and since we have supposed this child to be farsighted, he does not see objects near to him distinctly without additional effort or strain. Since his fusion sense is only poorly developed, it is not powerful enough to hold both of his eyes on the near object, and so the child looks at the object with the eye which he can focus easiest and allows the other eye to deviate. The direction of deviation in this eye is inward because in focusing the eyes on a near object the eyes, normally, turn slightly inward, and in this case the deviating eye turns farther in toward the nose as that is the easiest movement for it to make. During this period the squint at first is noticed only when the child looks at a near object and so may be called an occasional squint, but as this continues over a period of time, the

inward rotation of the deviating eye becomes habitual, being present even when the child looks toward distant objects, though it may be more marked when he looks at his picture books.

So far we have considered only the development of the squint, now for the consequences. The squint appears primarily because the child cannot fuse the images of the object. Even after the eye has deviated, the child has an image of that object formed in his eye and communicated to his brain so that at the onset of the squint the child probably sees double. However, with the eye turned to one side, the image communicated from that eye to the brain is not very clear, thus making it easier for the brain to disregard or suppress that image. Now add to the effect of turning the eye away from the object, the blurring effect which is the result of the child's poor vision and it is still easier for the brain to suppress the image. As the squint becomes more marked, the suppression increases and as the deviating eye is not being used it becomes blind. This blindness from disuse appears quite rapidly after the onset of the squint and, as a rule, is more rapid and more severe the younger the child when his squint appears. For instance, if a squint appears in a six to eight-months-old infant, he has a marked degree of blindness in eight to ten weeks, whereas the same degree of blindness may require a year to develop in a child who first begins to squint at the age of three years. This situation is all the more deplorable when we consider that with adequate early treatment the blindness in most of these cases may not only be prevented from becoming worse, but also the vision may be partly or completely restored.

Treatment

This brings us to a consideration of the treatment of these cases. The objectives of treatment are: first, and most important, to prevent deterioration of the vision of the deviating eye, and to restore, as far as possible, the sight of this eye in those cases in which blindness from disuse has already been allowed to occur; second, to endeavor to remove the fundamental cause of the squint by training the fusion sense at the earliest possible age; and finally to straighten the eyes.

The methods of attaining these objectives may vary somewhat in the various squint clinics, but the fundamental principles are the same, so we shall discuss the methods employed in the clinic at the State University of Iowa Hospital.

After we have obtained a history of the case, our first step is to determine how much the patient can see with each eye. With children of school age this is done with the usual alphabet and numeral charts, but for younger children we use charts that have pictures of dogs, cats and rabbits of graded sizes in place of the letters. For even younger children, we use graded sizes of white marbles which are rolled out to a distance of twenty feet and the vision is estimated by the ease with which the child locates the marble at that distance.

After having determined the vision, our next step is to fit the child with glasses. This is done by putting drops in the eyes and measuring them with a special instrument, which not only tells us the strength of glasses needed, but also whether the child is nearsighted or farsighted.

As soon as the glasses have been made for the child, they are put on him and the vision is again determined for each eye. If the vision now is found to be fairly good in each eye, the child is started at once on training to develop the fusion sense, but if the vision in the deviating eye is still poor, the next step is to attempt to build up the vision in that eye. We generally attempt to do this by blindfolding the good eye, making the child do all of his work with the poor eye. When the good eye is blindfolded, the child is generally listless and upset the first day, but on the second he goes about the ward and does his work in a normal manner. Because of this reaction to blindfolding the good eye, we feel that the best results are obtained only if that eye is blindfolded all the time. We keep the good eye blindfolded for varying lengths of time, checking the vision in both eyes at three to four-week intervals. This is done because we must not allow the vision in the blindfolded eye to fail from lack of use, even though the vision in the other eye is improving.

When the vision in the deviating eye has reached its maximum improvement, we attempt to develop the fusion sense. The instruments used in this type of training are merely modifications or im-

provements upon the simple stereoscope that used to adorn so many parlors. At first the instrument is adjusted to the angle of squint as it then exists, and simple charts are used to create an involuntary desire for fusion. One of the first sets of charts used has a bird on one chart and a cage on the other. The instrument is adjusted so that the child sees the bird in the cage. Then he is shown that, by altering the instrument, the bird can be made to go in and out of the cage. He is then taught to keep the bird in the cage while the instrument is being changed. When he can do this easily, he is given increasingly difficult problems of fusion until he has developed full binocular vision.

Early Treatment Essential

The results of this type of training depend largely upon two factors, first, the age of onset of the squint, and second, the length of time that has elapsed between the onset and the time that the child is brought to the clinic for training. In young children who are brought to the clinic shortly after the onset of the squint, glasses may be all that is required to allow the fusion sense to develop, but as the duration of the squint increases, the deviating eye loses vision and the full course of training must be used. If the child should reach an age of four or five years before the squint appears, he does not lose vision in the deviating eye as rapidly as the younger child, but here, also, the sooner the child is started on adequate treatment, the better the ultimate result and the shorter the period of treatment.

However, there are some children who do not respond to fusion training even though their vision has improved to normal by glasses and training. In these children the squint remains the same in spite of training, or it may change to the so-called alternating type of squint in which the child looks at an object with one eye at one time, and with the opposite eye at another time. The only course left in these cases is to straighten the eyes by operation. This, as you probably know, consists of changing the position of one of the muscles that control the movements of the eye so that the eye is swung around into a straight position. The straightening of an eye occasionally may be accomplished by one operation, but two or more operations may be required in some cases.

At this point it might be well to mention some misconceptions that seem to be fairly common among parents. One is that their child is too young to wear glasses, or can not be tested for glasses because he can not read letters. There is no child too young to wear glasses if he needs them, for special frames have been designed so that glasses can be kept in place even on an infant's eyes. Furthermore, it is not necessary for a child to know letters in order to be tested for glasses, for we use a special instrument to measure the child's eyes, and the only thing he has to do is to look at a light on the instrument. Another misconception is that a child may "grow out" of a squint. This is probably based upon the fact that during the first year of life every baby's eyes cross momentarily at various times, but by the time he is one year old, the normal child no longer does this. Furthermore, it is true that a squint occasionally becomes slightly less marked as a child reaches puberty, but by that time the deviating eye is hopelessly blind so that he has to pay a very high price for the small chance of "growing" out of a squint.

Conclusion

In conclusion, it has been the purpose of this discussion to bring out some of the features of that group of squints which embraces the majority of cases and which offers good results from adequate early treatment. These features may be summarized briefly as follows:

1. The majority of this type of squints appear between the ages of one and six years, with the largest number occurring before the fourth year of life.

2. This age incidence corresponds with the period in which the fusion faculty develops normally.

3. The squints develop primarily because the patient either fails to develop or only partially develops a fusion faculty.

4. The most important secondary or contributory factors in the development of this type of squint are poor vision and heredity. The poor vision may be due to farsightendess, nearsightedness, or astigmatism.

5. Once an eye begins to deviate, the patient disregards the images formed in that eye, and blindness develops from lack of use.

6. Blindness from disuse develops more rapidly the younger the child when the squint first appears.
7. The objectives of treatment are:
   a. To prevent blindness from disuse in the deviating eye, or to restore sight if blindness has already developed.
   b. To develop the fusion sense.
   c. To straighten the eyes.
8. Best results are obtained by adequate early treatment.

Eye Health Primer for Nurses

Francia Baird Crocker, R.N.

AN outline on eye health for the guidance of nurses—whether school, public health, private duty, or hospital nurses

EVERY nurse is the guardian of innumerable eyes, regardless of her special field of interest. The student of nursing; the institutional and private duty nurse; the public health nurse, engaged in school, industrial or visiting nursing—each should know how to protect well eyes to keep them well. When there is deviation from normal the nurse should recognize the need for prompt and competent ophthalmological care for those persons for whom she is in any way responsible. The nurse who understands how to protect and care for the eyes can render an invaluable service by teaching others how to safeguard their eyes.

Through the eyes the majority of the sense impressions are received. Sight is, therefore, the most valuable of the special senses; the importance of safeguarding and conserving this precious faculty cannot be overemphasized. Growth and development are influenced by eye health. Selection of occupations and achievements in them may be largely dependent upon eye health. Eye health, in turn, may be influenced by general health. To safeguard this very important sense, nurses need to know that the conservation of sight and the prevention of blindness begins long before birth and continues throughout the span of life.

If the eyes are to function to the best advantage, the following conditions are important:

1. Both eyes working in co-ordination and free from disease or defect.
2. Essential physical surroundings for using the eyes with comfort and efficiency.
3. Unobstructed avenues of approach to the visual centers of the brain and ability to interpret the message received by the brain.

If the eyes fail to work in co-ordination, usually there is a loss of efficiency in seeing. Disease or defect of some part of the eyes may impair vision by interfering with the formation of a clear image or by obstructing the message on its way to the brain. The visual area may be so impaired that it is incapable of functioning.

I. Prenatal and Postnatal Care

Why Is It Necessary to Emphasize Early Prenatal Care?

Adequate health measures during the prenatal period are as important to eye health as to general health. Attention should be directed to:

> Securing optimum nutrition for the expectant mother; physical examination, including an eye examination, for early detection of disease; and the necessary treatment.

How Does Syphilis Affect the Eyes?

Numerous eye diseases may be due to syphilis (congenital or acquired). Chief among these are:

1. Interstitial keratitis, which is an inflammation of the cornea and often permanently impairs vision.
2. Inflammatory conditions of the uveal tract, which is composed of the iris, ciliary body, and choroid.
3. Optic atrophy.

These conditions are responsible for a large percentage of the blindness among 114,000 blind persons in the United States.

To insure a healthy baby, free from syphilis, a complete examination, including laboratory tests in the first weeks of pregnancy, is necessary to determine whether the expectant mother needs treatment. The earlier treatment is begun for the expectant mother the better is the chance for the baby to be born free from syphilis.

Does Your State Require the Use of a Prophylactic in the Eyes at Birth?

If the use of a prophylactic is required, does it apply to: all births; midwives only; physicians only; hospital and maternity homes only; patients with suspected infections only; or is it waived if parents object?[1]*

Are All Infections at Birth Due to Gonorrhea?

Approximately more than half are due to this infection. The rest are due to infections by some other organism present in the

* Footnote numerals refer to items in the Supplementary Notes, p. 47 ff.

birth canal.[2] A prophylactic in the eyes at birth is important in reducing the number of all birth infections of the eyes.

What Can a Nurse Do to Prevent Birth Infections of the Eyes?

She must help in educating each expectant mother to insist on the use of a prophylactic in the eyes of her baby at the time of birth in order to guard against all infections. If a known gonorrheal infection exists, or the expectant mother has a vaginal discharge from any cause during the prenatal period, the nurse should route the expectant mother for examination and encourage her to remain under treatment as long as necessary in order to lessen the danger of infecting the eyes of the baby at the time of birth or afterward.

Among Children, Which Eye Conditions May Be Considered as Congenital and Hereditary as to Cause?

Disturbances in foetal development may result in: cataract, abnormalities in the size of the eyeball (megalophthalmus, microphthalmus), aniridia (absence of the iris), albinism (lack of pigment), retinitis pigmentosa (progressive pigmentary degeneration of the retina).[3]

Although some of these congenital abnormalities may be caused by malnutrition or disease, many are hereditary in nature. Attention should be focused upon the risk involved in enlarging families in which there is a hereditary tendency to any of the above conditions.

II. Testing of Visual Acuity

What is Meant by Testing of Visual Acuity?

The testing of visual acuity is a means of determining acuteness of central vision in each eye.[4] It is the most common method of detecting deviations from normal. By using this test it is possible to find many persons of all age groups who are in need of examination by an ophthalmologist. However, there are some significant eye conditions which do not affect central vision. For these, other signs of departures from normal must be sought.

In Addition to the Test, What Observations Can a Nurse Make?

Objective Inspection

1. Even though the central visual acuity is found to be within the range of normal during the test the nurse can observe evidences suggesting visual difficulty, such as: abnormal posture of head or body during the test, frowning, an

obvious effort to see the chart during the test, and eyes filling with tears.

2. The nurse may include in her inspection: observation of the lids and the lining of the lids and note any deviation from normal, as unusual redness, swelling, or discharge; shape of the iris and pupil; and whether or not the two eyes are working together.

Subjective Evidences

Complaints of blurring of vision, double vision, headaches, eyes hurting when reading or using the eyes for close work.

The nurse should be well acquainted with the appearance of the normal eye. When any of the above evidences are presented, she can recognize, within certain limitations, deviations from normal and can advise prompt and competent ophthalmological examination.[5]

When Should the First Test of Visual Acuity Be Given?

A vision test should be part of the health examination of every preschool child if eye difficulties are to be discovered and to be corrected before the period of school life begins.[6]

What Kind of Test Chart Can Be Used?

The Symbol E chart.[7] This chart is scaled according to Snellen measurements. The scale of Snellen measurements is approved by the Section on Ophthalmology of the American Medical Association. The characters on the chart are equal in visibility, and the chart can be used for children who do not read and those who do not hear.

Can the Same Chart Be Used for Children of School Age and Where May the Chart Be Secured?

Either the Symbol E chart or the Lines of Letters chart, drawn to the Snellen scale, may be used.[8] Several optical supply companies publish the Snellen Lines of Letters chart, fewer companies publish the Symbol E chart. Both charts may be secured from the National Society for the Prevention of Blindness.[9]

How Much Illumination Should Be Directed on the Test Chart?

Approximately 10 foot-candles[10] of illumination, either from a natural or artificial source and free from glare, has been found to be an acceptable level. Through research and experimentation, Ferree and Rand[11] of Johns Hopkins University have found this

amount of illumination to be acceptable for the purpose of testing for visual acuity. An intensity of more than 10 foot-candles of illumination, by giving compensation for possible defects, tends to eliminate many persons who should be referred for examination, while an intensity of less than this amount tends to include many persons not in need of further examination.[12]

III. Deviations From Normal

What are the Most Common Eye Difficulties Found Among Children?

1. Errors of refraction of various degrees and seriousness. (See page 47 for description.)
2. Failure of the two eyes to work together arising from a variety of causes and generally referred to as strabismus or squint.
3. Eye diseases affecting the different parts of the eye.
4. Congenital and hereditary eye defects.

Any of these conditions may impair visual acuity but all of them do not fall within the group of eye difficulties leading to blindness. Many of these eye difficulties are closely related to diseases affecting the general health.

Why Do the Two Eyes Sometimes Fail to Work Together?

Ophthalmologists are not entirely in accord as to the classification which should be made regarding the underlying cause or causes of this deviation from normal. Some of the significant factors of practical value in understanding why the two eyes may fail to work together are:

1. Relationship of the two eyes is sometimes disturbed due to a difference in the state of refraction of each eye.
2. At birth there may be imperfect vision in one eye.
3. There may be a deviation from normal of the muscles which control the movements of the eye as: lack of muscle tone, defects in the size and insertion of the muscles, or a paralysis of the muscles of the eye.
4. The fusion faculty[13] may be lacking or fail to develop perfectly.
5. Eye disease or injury may be responsible for the failure of the two eyes to work together.

One or more of the conditions mentioned above may be responsible for the failure of the eyes to work together.

When the Two Eyes Fail to Work Together What Can Be Accomplished by Treatment?

After the cause has been determined by means of complete eye examination it is possible for the ophthalmologist, in some cases, to improve and conserve vision through adequate treatment and proper glasses. From the nurse's standpoint the most significant points to remember in regard to treatment are:

1. The kind of treatment and its effectiveness are dependent upon the cause.
2. The cause can be determined only by means of a complete and competent eye examination.
3. Faithfulness in carrying out treatment is essential for the best results.
4. Special effort should be made to secure treatment for the preschool child. The earlier treatment is secured the greater the chances for improving vision. Every child should be given an opportunity for beginning school life free from a visual handicap which may seriously retard his school progress.

What Are the Most Common Causes of Blindness Among Children?

According to a recent study[14] these causes may be given in percentages as follows: infectious disease, 28.6; neoplasms (tumors), 2.2; traumatic and chemical injuries, 7.8; toxic poisoning, .1; noninfectious systemic diseases, 1.2; congenital and hereditary, 51.1; unspecified etiology, 9.0.

Classified in another way the most common causes are diseases affecting: the eyeball, 31.0; cornea, 14.4; iris and ciliary body, 2.2; crystalline lens, 17.1; choroid and retina, 14.4; optic nerve, 16.7; vitreous humor, .3; and miscellaneous, 3.9.

What Are the Most Common Causes of Blindness Among Adults?

Figures are not available for classification of causes as given above for causes of blindness among children, but the following are the most frequent conditions found to be responsible for blindness among adults:

1. Cataract
2. Optic atrophy
3. Glaucoma
4. Corneal ulceration
5. Uveitis
6. Choroiditis
7. Chorioretinitis
8. Retinal degeneration

What Is the Relationship Between Eye Health and General Health?

Conditions affecting the general health may in turn affect the eyes. A few of these are: nervous disorders, focal infections, tuberculosis, syphilis, hypertension, acute infectious disease, disorders of metabolism, and brain tumors. Some of these conditions may be manifested by eye difficulties before the underlying cause in the general health is found. When this occurs prompt recognition and treatment are necessary if vision is to remain unimpaired or partially preserved.

IV. About Glasses

What Should a Nurse Know About the Use of Glasses?

1. Glasses are worn to overcome errors of refraction, enabling an individual to see better and relieving the eyestrain and the nervous strain which may result from the effort to see where the vision is defective.
2. They are usually necessary as a part of the treatment plan when the two eyes are not working together.
3. After various eye diseases the glasses or a change of glasses may be necessary.
4. An example of a very important use of glasses is after an operation for the removal of a cataract in which the lens of the eye is removed and a substitute lens in the form of glasses must be supplied.
5. In middle life when physiological changes occur in the eyes, glasses are usually required for any close work.
6. Glasses are used for protection in certain industrial occupations.[15]

When Are "Drops" Used in the Eyes in Testing for Glasses?

The majority of ophthalmologists advise the use of drops in testing the eyes of children and young adults and for those older persons who are unable to co-operate with the ophthalmologist during the examination. By using drops the eyes are placed in a state of rest and the results of the test are not influenced by the individual's ability to bring his accommodation effort into play.

With the use of drops in the eyes the ophthalmologist is able to observe the internal parts of the eye and detect the presence of disease. This is particularly important if early evidences of disease are to be noted, as often there are changes within the eye not evident to the person himself until after it is too late to prevent serious or permanent impairment of vision.

What Are Some Additional Facts About Glasses and Their Care?

1. Each person should have glasses properly fitted according to his eye difficulty, shape and size of his head, and the position of his eyes.
2. Glasses need to be kept clean and properly adjusted.
3. The time for re-examination of the eyes should be determined by the ophthalmologist. If there is a progressive eye condition frequent, examination will be indicated.
4. No general rule applies regarding the use of glasses. Some individuals need to wear glasses at all times, others only for certain eye tasks. Some individuals need fairly frequent changes of glasses, others infrequent changes. Some individuals must wear glasses throughout life, others may be able to discard their glasses. Each case must be decided by the ophthalmologist upon the basis of the individual's need.

V. Comfortable Eye Environment

What Are the Essential Physical Arrangements for Eye Comfort?

Adequate illumination, whether natural or artificial, should be well distributed, and free from glare. The amount of illumination must be determined by the type of work or recreation for which it is needed, and by the visual powers of the individual. The source of illumination should be outside the range of vision. The bulletins listed in the Supplementary Notes emphasize lighting.[16]

Does Reading in Bed Harm the Eyes?

If the proper posture is maintained, adequate light is supplied free from glare, and attention is given to the selection of the size of the type and the character of the paper upon which the printing is done, reading in bed is not harmful to the eyes. Reading in bed during an illness should not be encouraged even with the physical arrangements mentioned above, except with the consent of the physician. After a serious illness special attention should be directed to the protection and care of the eyes. During convalescence the delicate structures of the eyes may be damaged through misuse and overwork.

VI. Eye Accidents

What Are the Causes of Eye Accidents Among Children?

1. Weapons: air rifles, shot guns, blank cartridges and cap pistols, slingshots, arrows, stones, tear gas guns.
2. Fireworks: firecrackers, torpedoes and bombs.

3. Explosives: gunpowder and dynamite.
4. Sharp pointed objects: knives and scissors, nails, sticks, wires and hooks.
5. Flying particles: chips of steel, wood, glass, and other objects.
6. Games and sports: baseballs and bats, golf clubs and balls, fishing, swimming, spinning toys.
7. Automobile accidents.
8. Burns: chemicals and hot objects.[17]

If an eye is injured, especially in the case of a penetrating wound, nurses need to be aware of the danger of sympathetic ophthalmia developing in the other eye. Prompt, skillful care of any eye injury and continued eye observation are of utmost importance. Sympathetic ophthalmia may develop in the uninjured eye several weeks or even months after the original injury.

It is not always possible to avoid all eye hazards and education in thinking *safety*, and playing *safely* is the only ultimate protection for children.

What Are the Accident Hazards in Industry?

Flying chips of metal, mineral, or wood; splashing liquids, molten metal, acid or injurious chemicals; exposure to excessive radiated heat; and explosions of endless variety.

Nurses can encourage managements to equip workers with protective equipment. Safety equipment manufacturers and optical companies are always glad to advise the proper kind of equipment necessary for a particular occupation. In the purchase of goggles, head masks, respirators, etc., care should be taken that they conform to the requirements set forth in the "National Safety Code for the Protection of the Heads and Eyes of Industrial Workers."[18]

What Constitute Other Eye Hazards in Industry?

1. Uncorrected errors of refraction, and eye diseases which impair vision.
2. Spreading eye infections through disregard of sanitary practices.
3. Incompetent and dangerous first-aid measures in cases of eye injuries.
4. Inadequate and poorly adapted illumination for the occupation especially from the standpoint of eye comfort and efficiency.

Every industrial nurse should know and teach the value of protecting the eyes by means of safety devices; insist upon prompt

medical attention and extended care in cases of eye injuries; secure correction of eye defects; build up standards for general health; and promote activities for improving sanitary conditions affecting eye health.[19]

VII. Partially Seeing Children

What Can Be Done for Children Who Are Not Blind but Who With All Possible Correction Have Impaired Vision?

In many regular school systems there are classes for partially seeing children. They are known as "sight-saving classes" or "sight conservation classes." Where no classes are provided special educational aids can be provided for each pupil. Only those children are referred who, in the opinion of the ophthalmologist, may be benefited by such educational aids.[20]

How Can Nurses Assist with This Group of Children?

Although it has been estimated that approximately one child in five hundred of the elementary school population has seriously impaired vision, only about 5,000 children have been given assistance through special educational aids. Nurses need to know which children should be given the benefit of such assistance.[21]

Have You Learned

1. Why prenatal care is important for eye health?
2. About the care of the eyes at birth?
3. Something about testing for visual acuity?
4. Regarding the care of the eyes of preschool and school children?
5. Safeguarding the eyes during play?
6. Protecting the eyes in industry?
7. Adapting the physical environment for eye comfort and efficiency?
8. Conserving sight and preventing blindness through proper care when deviations from normal appear?

VIII. Explanation of Some of the Eye Conditions Which Frequently Cause Blindness

Term	Part of Eye Involved	Cause	Explanatory Notes
Cataract	Lens or lens capsule	A cataract may be congenital or senile and, in addition, may be due to any of the following: trauma, ocular disease, general disease, and occupation.	When a cataract is present from any cause, there is an opacity of the lens or the capsule of the lens. The extent of visual impairment depends upon the location and the degree of opacity.
Choroiditis	Choroid	Most frequently caused by acquired or congenital syphilis, tuberculosis, and focal infections from oral and nasal cavities.	The choroid, dark membrane, forms the middle coat of the eye and serves as an organ of nourishment for the other parts of the eye. Any disease of the choroid may affect the neighboring structures which are: the retina, iris, optic nerve, vitreous, sclera, and lens.
Glaucoma	Eyeball	Unknown.	Glaucoma is characterized by an increase of the tension within the eye. It may be primary or secondary to some pre-existing disease. It is a common eye disease and occurs usually in the eyes of persons past middle life, but may be found in children. The latter form is called congenital glaucoma, or buphthalmus. It always impairs vision and constant ophthalmic care is necessary to conserve the remaining sight. It ranks high in the causes of blindness and frequently it is not detected until after the vision is permanently impaired.

VIII. Explanation of Some of the Eye Conditions Which Frequently Cause Blindness—(*Continued*)

Term	Part of Eye Involved	Cause	Explanatory Notes
Iritis	Iris. Iritis frequently involves the ciliary body and is then called iridocyclitis.	Focal infections, syphilis, tuberculosis, gonorrhea, acute infectious disease, diabetes, result of injury, cause not always known.	It is necessary to treat the underlying cause as well as the eye condition. If tuberculosis is the cause, injections of tuberculin are usually part of the treatment, as well as general treatment for tuberculosis. If syphilis is the cause, anti-luetic treatment is advised. In the case of focal infections removal of the cause of infection is part of the treatment plan. Vision may be greatly impaired.
Keratitis, Phlyctenular	Cornea. If conjunctiva only is affected it is then called phlyctenular conjunctivitis. If it occurs at the limbus (the place where the cornea and conjunctiva join), it is called phlyctenular kerato-conjunctivitis.	Tuberculosis and poor general health.	Tuberculosis is the most common cause; it usually occurs in children, particularly those children whose general health is poor. Because ulcers form as a result of the inflammatory condition vision may be impaired due to the resulting scars of the cornea.
Keratitis, Interstitial	Cornea, but may also affect entire uveal tract.	Usually due to congenital syphilis. May be due to acquired syphilis.	Most frequently occurs before the age of 15. Vision is apt to be seriously impaired as the inflammatory process often leaves dense opacities of the cornea.

Optic atrophy	Optic nerve	Primary optic atrophy may be due to syphilis, diabetes, affections of the brain. Secondary optic atrophy may be due to other eye diseases as: glaucoma, retinitis choroiditis. It may be hereditary. Injury may also be a contributing factor.	In case of primary optic atrophy blindness usually results. In secondary optic atrophy there is a better prognosis. Vision may be impaired, but complete blindness may not result.
Retinitis	Retina, and usually extends to optic nerve and choroid	May be primary or secondary with the following general causes: diabetes, syphilis, nephritis, trauma, etc.	General treatment of the underlying cause is of greatest importance.
Retinitis pigmentosa	Retina	Hereditary	Vision is progressively impaired and treatment is of little avail.
Retinal detachment	Retina	May be due to injury, and to ocular diseases.	Surgical treatment for reattachment is frequently effective. Early diagnosis is an important factor in prognosis.
Tumors	Choroid, retina	Unknown.	An ocular tumor may involve the brain. Prompt treatment is imperative and many times radical treatment, as removal of the eye.
Uveitis	Iris, ciliary body and choroid.	Essentially the same as the causes of iritis.	Loss of vision or serious impairment are the rule rather than the exception.

IX. Errors of Refraction*

Term	Part of Eye Involved	Cause	Explanatory Notes
Astigmatism	Cornea, lens	Deviation from the normal in the curvature of the cornea, lens or both. May be hereditary or congenital.	In general astigmatism can be described "without a focal point."
Hyperopia	Eyeball	Deviation from the normal shape of the eyeball (which is too short). Deviation from normal in the curvature of the refracting surfaces or in the refracting media. One or more of these conditions may be responsible.	The common term is farsightedness.
Myopia	Eyeball	Deviation from the normal shape of the eyeball (which is too long). Deviation from normal in the curvature of the refracting surfaces or in the refracting media. One or more of these conditions may be responsible.	The common term is nearsightedness.
Presbyopia	Lens, ciliary muscle	Chiefly due to loss of normal elasticity of the lens,	This is a condition due to a physiological change in the eyes of persons past middle life. It is manifested by a loss of accommodation for near vision.

*The term error of refraction is used to designate the condition which results from any interference of the rays of light which normally should enter the eye in such a way that they are brought to a focus on the retina.

It is important for the nurse to know that practically all eyes are hyperopic or farsighted at birth. Along with the physical development in general, there is an elongation of the eyes throughout the period of growth, which continues until the normal state of the eye is reached, permitting the rays of light to focus images perfectly on the retina. If elongation is continued beyond what is normal the rays of light entering the eye are brought to a focus in front of the retina instead of on the retina where they must focus if a clear image is to be formed. This condition is known as myopia. If elongation stops before the eye reaches normal shape, the rays of light entering the eye, if extended, would be brought to a focus behind the retina. This condition is known as hyperopia.

Not only must the eyeball be normal in shape to bring the rays of light to a focus on the retina but the refracting surfaces and the refracting media must be free from defect. The refracting surfaces are the cornea and the anterior and posterior surfaces of the lens. The refracting media are the aqueous, the lens substance and the vitreous.

An error of refraction may be the same in each eye. It may vary between the two eyes, and hyperopia may be present in one eye and myopia present in the other eye. When the error of refraction is the same in each eye it is possible to have a different degree of error in each eye. Both myopia and hyperopia may be complicated by the presence of astigmatism. If astigmatism is present the condition is then known as hyperopic astigmatism or myopic astigmatism depending upon whether the eyes are myopic or hyperopic.

The degree of error of refraction may change due to disease, injury or developmental changes, the latter occurring more or less throughout the whole period of life.

The science of physiological optics is extensive and only a brief introduction to the subject can be given here. It is important for the nurse to remember that the kind and degree of error of refraction and the correction of that error of refraction are dependent upon several different factors as indicated above.

Supplementary Notes

1. *Prevention of Blindness in Newborn Babies. No. D63. Indicates the practices of health departments, maternity hospitals, and medical schools in the United States and Canada.

* These publications may be obtained from the National Society for the Prevention of Blindness, Inc., 50 West 50th Street, New York, N. Y. Nurses may secure single copies free, with the exception of No. 6 and No. D77. These are longer publications and there is a small charge for them.

2. Organisms in addition to the gonococci which may be responsible for eye infections at birth (ophthalmia neonatorum) are: pneumococci, bacterium coli, staphylococci and streptococci.
3. A study of children in schools for the blind shows that slightly more than 50 per cent of the children are blind as a result of a transmissible condition. Berens, Conrad, Kerby, C. E., and McKay, Evelyn C.: The Causes of Blindness in Children, *Journal of the American Medical Association*, 105: 1949–1954, December 14, 1935.
4. Central visual acuity means ability to recognize distinctly the form of an object in the direct line of vision. Field or peripheral vision, on the other hand, is the awareness to perceive the mere presence, motion, or color within the field of vision. The former utilizes the area of the most acute vision of the retina. This area is called the macular area of the retina. The field or peripheral vision utilizes the remaining area of the retina which is not capable of distinct vision.
5. Any inspection made by the nurse is solely for the purpose of gross screening. Accurate tests of central visual acuity, and of peripheral or side vision; tests for determining the muscle coordination of the two eyes; tests for fusion; and a thorough examination of the external and internal parts of the eyes are a part of the eye examination of the ophthalmologist and are not done in the regular course of the nurse's inspection.
6. *The Eye Health of Young Children. No. 176.
7. The Symbol E chart is used by the National Society for the Prevention of Blindness.
8. Suggestions for testing of visual acuity can also be secured from the National Society for the Prevention of Blindness.
9. *Conserving the Sight of School Children. No. 6.
10. Light is measured in foot-candles. A light meter for measuring the intensity of illumination can sometimes be borrowed from a local light and power company. Information concerning the light meter can be secured from the National Society for the Prevention of Blindness or by writing directly to the following companies: Weston Electrical Instrument Corporation, Newark, New Jersey; Westinghouse Electric Company, 30 Rockefeller Plaza, New York, N. Y.; Sight-Light Corporation, 342 Madison Avenue, New York, N. Y.
11. Ferree, C. E., and Rand, G.: The Testing of Visual Acuity, *American Journal of Ophthalmology*, 17:7, July, 1934.
12. Standard test material, standard illumination on the chart, and a consistent method of testing are desirable from the standpoint of the individual's eye record to determine improvement or loss of visual acuity, and also from standpoint of all records

in order to have comparable records for study. A standardized procedure in testing vision is particularly desirable for nurses doing school inspections, so that some basis for comparison may be kept from year to year. Nurses moving from one community to another can carry out their programs with less loss of time if standardized equipment and methods are used by all nurses.

13. The fusion faculty is not present at birth, but develops during the period of growth. Most authorities consider that the fusion faculty is complete by the age of six. Fusion is the ability of the brain to unite the images of each eye so that only one image is perceived. Largely as a result of this process it is possible to observe not only length and breadth but depth of the object viewed.
14. *Ibid.* 3. The Causes of Blindness in Children.
15. *Eyes Saved in Industry. No. 62.
16. *Lighting for the Conservation of Vision. No. 123.
    *Lighting the Home for Health and Happiness. No. 53.
    *The Well-Lighted School House—A Co-operative Effort. No. D54.
    *Standards of School Lighting. Prepared jointly by The Illuminating Engineering Society and the American Institute of Architects. No. D77. (This bulletin is being revised.)
17. *Eye Hazards in Play. No. 146.
18. *National Safety Code for the Protection of the Heads and Eyes of Industrial Workers. No. D81.
19. *Eye Protection in Industry. No. 77.
20. *Sight-Saving Classes in School Systems. No. 4.
21. *Organization of Sight-Saving Classes. No. 88.

A Sight Conservation Program in School*

Edythe P. Hershey, M.D.

AN exposition of the methods used by the Dallas, Texas, Board of Education in carrying out its sight conservation program in the schools

A COMPREHENSIVE sight conservation program in a department of school health work should include: 1. Routine annual examination of children to determine those who have defective vision; 2. A follow-up program for correction of such defects; 3. A study of findings to determine the cause and prevention of impaired vision, as well as the relation of such impairment to the child's progress and adjustment in school; 4. Health education projects dealing with care of the eyes.

Annual routine vision examinations are necessary for all children in order to detect vision defects in the early stages, so that adequate correction may be made and progress of such defects arrested if possible. A program for annual routine examination of vision was started in 1930–31. During this session 75 per cent of the children enrolled were examined and 10.6 per cent were found to have vision defects. However, it was found that only 7.5 per cent of these had corrections and it was evident that an educational program was necessary to inform parents concerning the defects found and the need for adequate correction. For the past two years this program has been emphasized. The known cases were followed from year to year and during the past year practically every child enrolled had a vision examination. Twelve and one-tenth per cent were found defective. Of these, 31 per cent have been corrected. It was possible to increase the number of corrections from 141 during 1930–31 to 1,180 during 1932–33 by a care-

* Abstracted from a report to the Board of Education, Dallas Public Schools, Dallas, Texas.

fully outlined program to follow every case from year to year regardless of the number of transfers the child might make from school to school.*

The nurses were given three lectures of instruction in eye examinations by a member of the Eyesight Conservation Committee of the Academy of Ophthalmology and Otolaryngology. The goal was set to examine every child enrolled. Lists were prepared of defective vision cases reported the two previous years so that these cases could be given immediate attention rather than delay corrective work until the case was discovered by routine examination. The follow-up phase of the work was organized so that the parents were informed of the defect found, advised concerning proper care, and repeated contacts were made to insure correction. Parents were invited to school so that the examination could be demonstrated. If the parent did not respond, home calls were made. If the economic status of the family did not make it possible to provide for the correction, the case was referred to a clinic. Through the interest of the Lions Club a fund was provided for buying glasses at cost for indigent children. One hundred and ninety-four cases were enabled to get the prescriptions for glasses filled through this fund. Twenty-seven per cent of the cases corrected were referred to clinics and sixty per cent of these were referred for help in getting the glasses prescribed.

While the sight conservation program has made it possible to detect the cases of impaired vision and do the follow-up work on these cases, it is advisable to study our findings to determine the cause and prevention of the defects. We should then correlate these findings with the child's progress and adjustment in the school program and finally evolve a health education project regarding vision problems from the broadest viewpoint.

The study of vision defects necessitates refraction of the eyes to determine the condition of the eye as well as to determine the visual error and its correction by properly fitted lens. These examinations are done by ophthalmologists, either in private practice or through clinics. The function of the school health department is to sift out cases with defective vision and advise the

**Author's Note:* Since this report was made, the number of corrections has been increased to 65 per cent of the discovered defects.

parents and teachers concerning the child's condition. The majority of cases can be grouped as nearsighted, farsighted, astigmatic, or strabismus (crossed eyes). However, a number of cases have been found in which the underlying factor was congenital syphilis and these have been put on treatment accordingly, thus preventing progress of a most unfortunate condition. A few tuberculosis cases have been revealed by the interest which began in finding a vision defect. Other cases have abnormal eye conditions which materially affect the child's progress and if these are not under observation and understood by teachers and the school nurse, the child may be further handicapped by driving forces too heavy for him to carry.

A rather superficial study was made to notice the improvement in corrected cases. The results were most gratifying even though the study was not extensive. Case reports revealed not only marked improvement in academic progress, but a complete change in attitude and interest in many instances. Behavior problems and truancy cases showed personality changes and better attendance. Retarded cases have been able to make the grade when the vision defects were corrected but too large a number are repeatedly retarded because of inattention and reading disabilities which could be eliminated if the children had good vision without nervous strain.

The problem of the lighting conditions under which the child works is closely related to the problem of vision defects. While the vision defects will be found in both poorly lighted rooms and well lighted rooms, it has been demonstrated beyond doubt that those with vision defects receive the greatest benefit from good lighting, while those with normal vision become fatigued more quickly working under poor lighting conditions because of the eyestrain and nervous tension resulting from the frequent accommodation changes necessary.

It was, therefore, deemed advisable to study the lighting conditions in the schools as a number of lighting problems had been brought to the attention of the Department of School Health Work. To eliminate the personal factor in judging the lighting, an illuminometer was borrowed so that the intensity of available light could be scientifically determined in every room throughout

the elementary system. In this study an attempt was made to answer the following questions:

1. Are the natural lighting facilities in the room adequate?
2. Does the teacher understand the principles of good lighting and comply with these principles by the proper use of shades and best possible seating arrangement?
3. Is artificial light available and adequate for improperly lighted rooms or for other rooms on dark days?
4. Is the proper use made of artificial light to conserve vision as well as electricity?
5. Is the lighting of the room considered as a health education project and good principles of lighting made possible and adhered to?

The standards adopted were those set forth by the American Standards Association under joint sponsorship of the Illuminating Engineering Society and American Institute of Architects, September, 1932.

It was found that in several instances the natural lighting facilities were inadequate even though the examination was made on a bright day. A larger number showed inadequate facilities for cloudy days. Dallas weather bureau records show that during the school days there may be a rather high percentage of cloudy days. In the 1930–31 school session one hundred clear days were reported, thirty-four partly cloudy and forty-one cloudy or rainy.

In several instances the natural lighting conditions could be improved by treatment of the walls to provide a lighter tint with increased reflection. Trees and shrubbery eliminate light in a number of rooms. The arrangement of the seats could be improved in a number of rooms so that the lighting might come from the left rather than the right, and the seats moved to that part of the room which is most adequately lighted. This is particularly true in some of the primary rooms where the project material is used.

It was found that while the teachers were interested in getting good lighting, they do not always understand the underlying principles, nor distinguish glare from adequate light. A few rooms have a real problem of glare from reflected light and effort

might well be made to correct this. However, there is a tendency for the teachers to keep the rooms too dark. The condition of the shades indicated improper use of them. Many shades could not be adjusted. The cords were often missing or too short to allow for adjustment. Where dark shades are provided for the visual education work it was found that they do not roll in many cases and no provision was made for adjustment, so that these heavy shades cut out available light to a marked degree. Heavy opaque shades should be replaced as soon as finances permit. A teacher frequently judged the lighting of the room from her position rather than from that of the pupils.

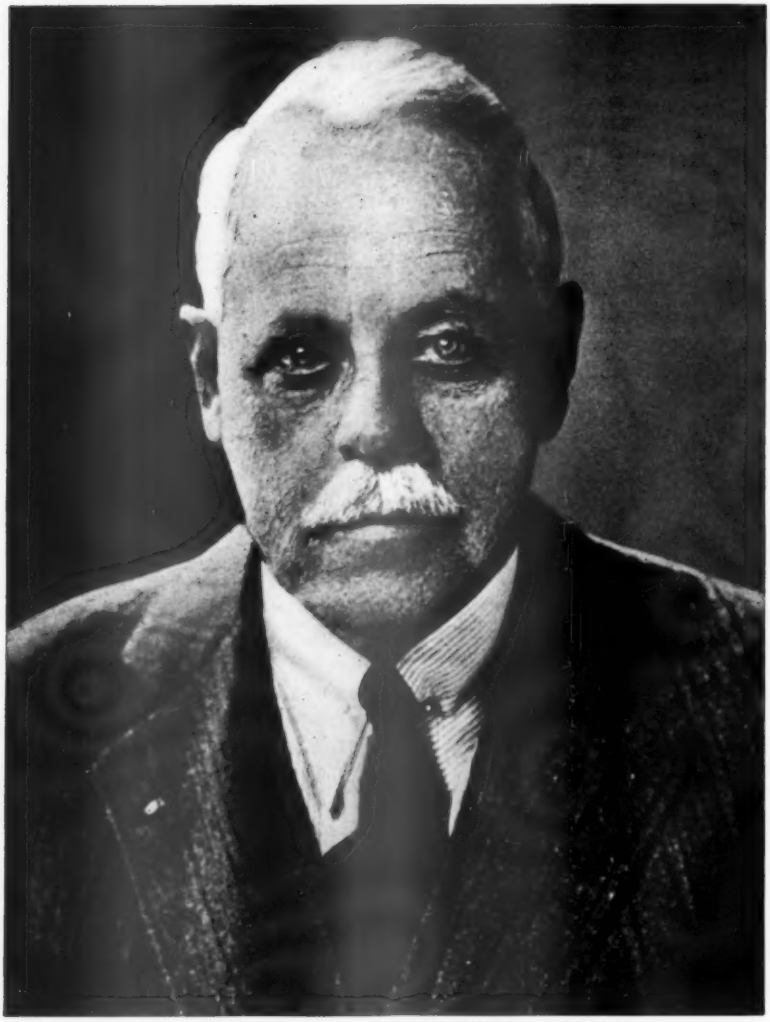
In the great majority of rooms artificial light is not often necessary. A study of artificial light provided revealed that many rooms have no means of artificial light regardless of how dark the day may be, and the majority of these with artificial light, excepting the new buildings, have a type of lighting not only inadequate but frequently of a harmful nature. The type referred to is that from open hanging globes. The majority of globes are clear rather than frosted and result only in a bright glare without diffusion. The globes vary in intensity, thus giving an uneven distribution of light, and are hung low in the rooms. The globe in use, where the illuminaires are used, is not always of sufficient strength for the area to be illuminated.

The distribution of outlets is not always adequate nor properly arranged. There are times and conditions where artificial light is essential, especially in art rooms and writing rooms. In some rooms no attempt is made to carry on a regular teaching program on rainy or dark days because of inadequate light. True economy in the use of light cannot be measured entirely by the electric light bill.

Every teacher should be concerned with the health education aspects of the lighting problem regardless of the subject she teaches. Children with vision defects were not always placed to the best advantage in the room. It was evident that more emphasis must be given to the lighting problem so that teachers and children will become more light-conscious in order that they will utilize the best available light. It is often easier to snap the button to turn on the light than to adjust the shades.

In consideration of these findings, the following recommendations are made with regard to the eyesight conservation program:

1. The annual routine vision examinations be continued and well organized follow-up be carried on in every case;
2. Further study be made to determine the cause and prevention of vision defects with particular study of the problems of retardation in children with serious vision handicaps, as well as their behavior and adjustment problems;
3. Further study of the lighting problem in our schools with a view to correction of those conditions which are particularly in need of correction.
4. The educational program should be sufficiently broad to cover all aspects of eyesight conservation. This will include:
   a. Education of the child concerning care of eyes;
   b. Education of parents concerning care of child's eyes and proper correction of defects;
   c. Informing the general practitioner in medicine as well as the Dallas Academy of Ophthalmology regarding the eyesight conservation program in the schools so that cases will be carefully studied and referred for adequate treatment and correction;
   d. Instruction for teachers concerning proper lighting adjustments for children with vision defects and an understanding of such defects so that children with symptoms of eyestrain may be referred to the nurse;
   e. Study of this program by the administrative officers so that there may be efficient lighting and true economy in the use of lighting; so that available natural light may be utilized to the fullest extent; and so that artificial light be conserved when not needed and provided when needed.



William Holland Wilmer: 1863–1936

Editorial

Dr. William Holland Wilmer

IN the passing of William Holland Wilmer his friends have lost a wise and sympathetic counsellor, his patients an understanding and inspired clinician, ophthalmology a great leader, and the world a great humanitarian.

On Dr. Wilmer's birthday, August 26, 1933, his pupils, associates and friends joined in wishing him health and happiness and many more years of fruitful endeavor and at that time dedicated to him a book, *Studies in Ophthalmic Science.* Those who were closest to him and knew him best hoped that, because of his improved health and mental vigor during the past ten years, the wish of his colleagues would give him at least ten years more of useful work, but he died peacefully at the zenith of his mental and physical vigor as he was preparing to leave his home to go to his office on March 12, 1936. He had performed operations the day prior to his death.

Possibly the greatest tribute to Dr. Wilmer and one of the greatest tributes to a living man was the formation of the William Holland Wilmer Foundation in 1924 by a group of his friends and patients. Mrs. Henry Breckinridge, the outstanding leader in this movement and one of the directors of the National Society for the Prevention of Blindness, was one of those who made an address when the Wilmer Ophthalmological Institute was dedicated at the Johns Hopkins University and the Johns Hopkins Hospital, October 15, 1929. Others who spoke in honor of Dr. Wilmer at that time were Herbert L. Satterlee, president of the William Holland Wilmer Foundation, Dr. George E. Vincent, president of the Rockefeller Foundation, Hofrat Ernst Fuchs of the University of Vienna, Sir John Herbert Parsons of the University of London and Dr. George E. de Schweinitz of the University of Pennsylvania.

For years students of ophthalmology and those suffering with eye diseases had made paths to his door from all parts of the earth. Upon the opening of the Institute their paths were turned from

Washington to Baltimore, where they received the same care and sympathetic attention whether they were poor or wealthy. Here he trained men in his technic and imbued them with his devotion to ophthalmology and it is certain that his influence will live to stimulate others. He was especially interested in the phases of his work concerned with the prevention of blindness and had been a director of the National Society for the Prevention of Blindness since December, 1925. Recently he co-operated actively in the formation of a District of Columbia Society for the Prevention of Blindness. Two days before his death a meeting was held in Dr. Wilmer's home at which this Society was formally organized, with Dr. Wilmer himself as president.

He was always interested in aviation, and during the World War was in charge of the medical research work in aviation first at Mineola and later in the American Expeditionary Forces at Issoudin, France. He was awarded the Distinguished Service Medal by the United States for his services during the World War and rose from the rank of Lieutenant to that of Brigadier General in the Medical Reserve Corps. He was also honored by France and decorated with the Legion of Honor.

Among the many prominent positions which he held in numerous organizations he was possibly proudest of the presidency of the American Ophthalmological Society. He wrote many monographs on subjects dealing with ophthalmology, and was the editor of the *History of Aviation Medicine* in the A. E. F. In 1934, he completed the *Atlas of the Fundus Oculi*, which contains personally supervised colored drawings of the appearance of the interior of the eyeball in various diseases.

It would be impossible for any one to give an accurate picture of the esteem in which he was held by his many devoted admirers, but the feeling of his friends has been beautifully expressed by one of his patients—"The light of many eyes and the comfort of many hearts has gone."

CONRAD BERENS, M.D.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

Eyes Right*

The eyes a baby starts with must last all his life!

Immediately following birth, the physician or some one professionally trained removes any mucus from the baby's eyes and inserts two drops of a one per cent solution of silver nitrate into the sac which surrounds each eye—not directly over the lens. This procedure has been generally adopted as a world-wide precaution, especially against gonorrheal infection. All mothers, regardless of how free they themselves may be from any disease, should demand this protection for their babies. Syphilis may be transmitted from a mother who has the disease to her unborn child. One of the manifestations of congenital syphilis is a serious eye condition. Careful physical examinations with blood tests will detect this disease in the pregnant mother; and treatment of her will pass through her body to the child.

We all constantly produce a fluid for the health of our eyes. Tear glands, under the outer border of the eyebrow, produce a secretion which continually bathes the eye; winking distributes this and mixes with it the material from the glands at the hairline of the eyelids. This fluid, with any dust particles present, is carried to the inner corners of the eyes, where it passes through fine ducts into the nostrils. Occasionally the connecting ducts between the eyes and nose are not open at birth, and secretion collects at the inner corners of the eyes or trickles down the cheek. Your doctor will tell you what to do for this—perhaps how to massage, gently, the upper part of the nose. If this canal does not open by the sixth to eighth month, some other procedure may be needed to pre-

* Reprinted, with permission, from *Good Housekeeping*, February, 1936.

vent the constant watering of the eye.

The overhanging bony ridge above the eye is a protection against falls or accidental blows. The lashes help keep out foreign bodies. Instinctive winking when objects come close to the eye prevents some dangers.

All parents know how wobbly are the eyes of a tiny baby. They may "float about," and only as the muscles grow stronger do the eyes work in unison. Some authorities state that three months is the time when you can expect a baby to focus his eyes. If there is a true cross-eye or squint, one eye or both eyes will be strongly pulled inward or outward. When you notice this, place your child at once under the care of an eye specialist. The danger ahead lies not only in the emotional reaction the child feels because he is ashamed of not looking like other children, not only in this handicap to good looks, but also the fact that the stronger eye will be used to the detriment of the other and that vision will gradually fail in the one which is less used.

There are eye exercises and other ways of strengthening the weaker eye. Mothers will do well to follow such directions implicitly, even though these duties must be added to an already well-filled day. Glasses may be suggested for this or other conditions. They can be fitted to children of one year or younger and can be made of non-shatterable glass if your oculist advises it. For certain conditions they need be worn only for a short period or through childhood.

The vision of a baby may be harmed through the mother's incorrect handling of his eyes. We do not wash babies' eyes routinely now, because we believe that Nature does a better job unaided. If you must remove particles of dust, you may use saline solution (½ teaspoonful of ordinary table salt to one glass of previously boiled warm water) or boric acid (1 teaspoonful of boric-acid powder to 1 glass of hot water, also previously boiled). Wipe off any surplus moisture at the *outer* corners of the eyes, and do not allow fluid or secretion to flow from one eye into the other. In case of an eye accident, close the eye and keep a clean soft cloth moistened with either saline or boric-acid solution over it until the doctor comes. In case of inflammation do not use medication until your doctor has had a chance to examine the eye and its secretion and can prescribe for it.

No baby should stare at the sun or at an electric light. Glare from white walls, water, snow, or even skyshine on a fairly dull day may be harmful. Face the baby away from the sun during the sun bath.

The eye has a natural mechanism which protects it against glaring light—the contraction of the pupil, winking, and the closing of the eyelids. Therefore we believe that no

child with normal eyes need be kept indoors on a bright day. Certain other precautions can be taken: the hood of the baby carriage may be lined with dark cloth; nursery walls should be painted a soft, dull tint, and ceilings also should be off-white, as a baby looks upward much of the time; objects should be kept at a distance from the child's face, and toys should not be hung in front of him.

All this detail may seem confusing, but constant vigilance is the price you pay for your baby's eyesight.

JOSEPHINE H. KENYON, M.D.
New York

Note and Comment

English Health Organization Teaches Eye Health.—"Many children are accused unjustly of being dull at school when, in fact, they are handicapped by the inability to see properly and by the consequent nervous strain which is thrown upon them in straining to overcome the defect," warns a press release of the People's League of Health (England). The League urges parents to watch for signs of eye trouble in their children, and urges medical consultation at the first suggestion of visual difficulty; for those of limited means, the National Eye Service is prepared to give expert medical eye examinations and needed spectacles.

Lighting for the Printshop.—Light is shed over every operation in a printing plant, in a recently released report of the Committee on Industrial and School Lighting of the Illuminating Engineering Society, on "Lighting in the Printing Industry." The Committee had found, in previous studies, that one reason for the lack of good lighting in industrial plants throughout the country was the lack of knowledge of specific requirements. This report aims to offer practical information on lighting in relation to operation techniques for printshops.

Fusion Training with Moving Pictures.—Sustained interest and enthusiasm are important tools in the training of fusion in young children. A double motion picture projector, to be used for fusion training, was demonstrated at a meeting of the section on ophthalmology of the Baltimore City Medical Society, according to a note in the *American Journal of Ophthalmology* for December. The twin projectors are as flexible in use as the slide projectors, and it is considered that the moving pictures hold the attention of the children very much better than still slides.

Follow-up of Eye Cases Shows Results.—A marked reduction in the number of cases of high myopia and in the number of partially blind children has been noted in the past year at the Middleton (England) Eye Clinic. Dr. S. T. Beggs, medical officer of health,

attributes the reduction to the frequent re-examinations and careful correction of defects, as well as to the advice given the parents about the care of the eyes at home.

Vitamin A—Eye Vitamin.—For nearly 4,000 years people have recognized the connection between food and the disease known as "night blindness." The Egyptians recommended the eating of liver to cure the disease as long ago as 1500 B.C. In lands where food shortages occur periodically, as in Labrador, night blindness, or xerophthalmia, has been noted during the long winter, and seen to disappear when the first supply boats bring more rounded diets in the summer. Countries having a low standard of living—Japan, China, and India—have many cases of night blindness, because the ordinary dietary is lacking in vitamin A, which is found liberally in milk, butter, eggs, fish, and green vegetables. Cases of xerophthalmia are sometimes noted in persons eating a liberally varied diet, whose systems are unable to assimilate the vitamin content of their food. An eyewash containing vitamin A may offer help to such people, according to an article on "When Starvation Brings Blindness," by F. Le Gros Clark, in the December *New Beacon*.

Aid to Miners.—Improvement of working conditions in mines has been a subject of investigation for many years, and advances have been made which have prevented many of the industrial hazards that mine workers formerly had to face. There has been a general brightening-up underground, which has had a good effect, both physically and psychologically. The more extensive whitening of the roadways, the increased use of steel arches and girders, and the high candle-power illumination at the coal face have made conditions of work more favorable. Miners' nystagmus, an occupational eye disease, has been found to be caused in part by inadequate illumination. The old type of miners' lamp gave off one foot-candle of light, and by the end of the day was so smoky that miners were working in darkness; it has recently been replaced by an electric lamp that gives a 6 foot-candle illumination. In a recent disability-compensation hearing in England, a physician found the claimant's vision normal, and suggested that the man might return to work if he were provided with the new type of lamp.

International Red Cross Seeks End of Syphilis.—"If every syphilitic woman were to undergo the treatment which the specialist can today give her, congenital syphilis would soon be stamped out," says a recent communication from the Secretariat of the League of Red Cross Societies. Describing the effects of congenital syphilis, which may appear before or at birth, shortly after birth, or not for anywhere from five to twenty years, and may attack mind and senses, the communication warns: "Comparatively late in life the eyes may be involved, the cornea losing its normal lustre and looking like glazed glass. This condition may end in almost complete blindness. Indeed, syphilis is the most important of all causes of blindness."

Nurse-of-the-Month Trachoma Worker.—One need not be a specialist in eye diseases to find trachoma one's special nursing and public health problem. *Public Health Nursing's* Nurse-of-the-Month, Maude King of Missouri, tells of the preponderance of work in trachoma in general rural nursing in Missouri. Her story tells of the seriousness of the trachoma problem and the difficulties of finding and treating cases. She says: "One of our first undertakings was a trachoma survey in Miller and Camden Counties, begun in mid-winter. The traveling was so difficult that I soon discarded my own car and set out with a lad in an open model T Ford. My companion never tired in his efforts to make the hills, but often we were compelled to go on horseback to the more inaccessible schools and to the little cabins which could be reached only by trail. Some of the schools were fitly named 'hard scrabble' and 'skin knee.'

"Following our round-up, clinics were held under the auspices of the United States Public Health Service in co-operation with the State Board of Health, which provided equipment for a temporary hospital. The patients were brought in by truck. In the beginning we found schools in the trachoma district with as many as 70 pupils, 50 per cent of whom were victims of trachoma. In making follow-up visits to the homes, we found many infant and preschool children in the primary stages of the disease, and parents and grandparents who were totally blind.

"As a result of this effort and that made by other counties faced

with similar problems, a United States Trachoma Hospital was established in the southern part of the state, convenient to the trachoma settlements. We now keep a close check on new cases which are immediately put under hospital care. Thus, we have been able to eliminate all active cases from schools and homes and through the Missouri Commission for the Blind have been able to give occupational training to a number of the partially blind."

Eye Symposium at Biennial Nursing Convention.—Included in the program of discussion meetings of the National Organization for Public Health Nursing at the Biennial Nursing Convention, to be held in Los Angeles June 15 to 19, is a symposium on eye health. The meeting will be under the auspices of the National Society for the Prevention of Blindness, whose representative, Mrs. Francia Baird Crocker, R.N., will be available for consultation throughout the Convention. The Society will participate in the exhibit, and welcomes all friends and nurses to its booth.

"Perfect Driver" Has "Normal Vision."—With the country becoming seriously concerned over the number of automobile accidents and fatalities has come an increasing demand for more stringent requirements for drivers. Just what rôle vision plays is a question that has been answered variously in state requirements for motorists. In New York State, the Snellen test is given by an inspector to all applicants for drivers' licenses. "The Portrait of a Perfect Driver" by Farnsworth Crowder, appearing in *Westways*, describes the visual requirements: "He (the perfect driver) has normal visual powers. This means normal acuity, or faculty to see, near and far, without fuzziness; normal depth perception, or ability to see into the third dimension and estimate distances; a normal field of vision, a field, that is, of 180 degrees or better, within which movements can be detected; normal color vision; normal resistance to glare, whether of sun or headlights; absence of ocular dominance that is so pronounced as to produce the condition of being one-eyed; absence of the phorias, which produce malfocus or even double vision; absence of an abnormally large scotoma or blind spot; absence of the tendency of the eyes to malinger, or to take vacations at inopportune times."

Insurance companies have a special interest in promoting driving safety, and the Aetna Casualty and Surety Company has recently demonstrated a device which tests many of the important factors in safe driving: a Reactometer measures speed of reaction; devices for testing color vision, effect of headlight glare, speed operation and steering ability are especially valuable. This demonstration unit is available for loan in local safety drives, and its use has not only emphasized the need for more selective licensing, but has given individual drivers an estimate of their powers and limitations.

Another addition to safe driving comes with the perfection of a polaroid glass; clear and colorless, it appears to be an ordinary glass, through which oncoming objects may be seen in the usual way. Glare, however, is deflected, because of the polarization of the light, which causes all the light rays to enter through the glass in straight, parallel planes. When blinding headlights, equipped with a sheet of Polaroid placed behind each headlight lens, are viewed through a Polaroid windshield, these brilliant lights appear to be almost out, although objects between the two sets of lights are brilliantly illuminated. Road tests have demonstrated that the whole of an approaching car can be seen, even to the exhaust fumes in the rear; pedestrians are seen as clearly as if no car were approaching. Through the use of Polaroid headlights and windshields the glaring headlight hazard, which has been an important factor in the increase of motor accidents after dark, can be eliminated at last.

The Ascertainment of Blind Children.—To meet the evident need of reaching blind children during the formative preschool years, the Child Welfare Committee of the League of Nations has undertaken a study of methods of discovering blind infants and young children. The formal census is not a reliable method of finding these children because the definition of blindness—too blind to be able to read ordinary school books—cannot be applied to young children. Then, too, parents, fearing that they might be separated from their child, are reluctant to volunteer such information. Although compulsory notification, either on the part of parents, physicians, parish priest, or health visitor might be brought about, it would be useless, according to the Committee's

report, unless it were supplemented by provisions which would aim at assisting the parents in the education of the blind child. Unfortunately, the prevention of blindness and its medical treatment are outside the scope of the Child Welfare Committee's inquiry; it is to be hoped, however, that the information might not only ameliorate the condition of the young blind child, but contribute to knowledge concerning causes of blindness and suggest practical steps to those organizations having special interest in the prevention of blindness in saving the sight of children yet to be born. The report is supplemented by reports from 22 countries on what is now being done to enumerate blind children.

Social Hygiene Association Offers Co-operative Membership.—In strengthening the relationship between the agencies working for eradication of venereal diseases and those striving for prevention of blindness, the American Social Hygiene Association is inviting "society memberships" in its organization to the National Society for the Prevention of Blindness and to all other groups having the prevention of blindness as a primary aim. A feature of the society membership provides that state and local society members may propose their individual members for joint membership in the Association, with full privileges of the *Journal of Social Hygiene*, the Social Hygiene News, pamphlets, etc., for $1.00 yearly dues.

Eye Safety a Vital Lesson in T.E.R.A. Projects.—"Eye injuries are one of our big problems," says director of safety R. I. Morrow, of the State of New York's Temporary Emergency Relief Administration, in a letter to the National Society. "We have distributed many thousands of goggles which are used on T.E.R.A. projects where they are breaking or chipping stone, or doing other work involving eye hazards. We have sent out posters and bulletins, we have had many safety meetings, discussing all types of eye injuries, and in extreme cases we have even laid off foremen and men who would not carry out the safety regulations. I think that we now have the situation pretty well in hand, and that the men are educated and realize the necessity of wearing goggles. It is indeed a pleasing sight to visit some projects in a remote part of the State

and find all the men who are breaking stone, wearing goggles over their eyes and not as necklaces. Of all the injuries occurring on T.E.R.A. projects, 2.3 per cent are eye injuries. One lost time eye injury occurs for each 3,333,000 man-hours worked." An analysis of the frequency of causes of eye accidents on the projects shows that breaking stone or concrete, or working nearby, accounts for 35 per cent of the accidents and walking or running into tree twigs or handling them accounts for 13.5 per cent. Another frequent cause of eye accidents is flying sand, occurring in 11 per cent of the accidents.

Michigan Rehabilitates Partially Blind.—Six hundred and sixty-eight partially blind persons have found employment in Michigan between the years 1921 and 1935, according to a report from the Division of Rehabilitation of the State Department of Public Instruction. Salaries ranged from between $10 to over $50 a week; selling, stock chasing and handling, machine operating, inspecting, assembling, and unskilled labor were job classifications in which most placements were made. The median salary fell between $21 and $30 a week. The normal range of salaries is encouraging to the promotion of adequate vocational rehabilitation.

Taking Chances with Blindness in Illinois.—Concern is shown by the Illinois Department of Public Health over reported figures of births as against the number of ampules of silver nitrate supplied free by the Department. In the 16 counties reporting, 8,614 babies were born, and only 3,221 ampules of silver nitrate were distributed to those counties. Says the *Illinois Health Messenger:* "While it is possible that silver nitrate was purchased in some instances, the probability of purchases enough to make up the discrepancy is remote. Silver nitrate solution has been distributed free by the State Department of Public Health for many years, so that practically all concerned with its use are aware of this fact. The weight of the evidence, therefore, favors the conclusion that no prophylaxis was used in the eyes of a considerable proportion of the babies born." Will figures four and five years from now show an increase in the number of children entering schools for the blind, afflicted since birth with a preventable blindness? asks the *Messenger.*

Causes of Blindness in Glasgow.—Analyzing the causes of 1,460 cases of blindness, it was found that congenital and undetermined causes—including myopia, the largest single cause of blindness—were the most frequent factors in blindness. The second largest group, blindness caused by infectious diseases, included blindness due to venereal diseases and chronic sepsis and accounted for 11 per cent of the whole. When separated into age groups, it was found that ophthalmia neonatorum and congenital syphilis are the greatest causes of blindness up through the age of four; myopia, the most common individual cause of blindness, occurring in 17 per cent of the cases, develops chiefly between the ages of five and fifty. Of interest is the knowledge that "total blindness due to gonorrheal ophthalmia is now of rare occurrence. This notable advance has been made possible by the inclusion since 1912 of ophthalmia neonatorum among the notifiable diseases, and the subsequent arrangements made for prompt notification and hospital treatment, and for the supervision of midwives under the Midwives' Act. Between 1912 and 1932 only six children have become blind in both eyes (none since 1924); loss of sight in one eye has occurred in 42 cases (six since 1921 and none since 1930); recovery with some degree of impaired vision was noted in 50 children (ten since 1921, and one since 1929). There is evidence that syphilis, both congenital and acquired, is tending to decline. Antenatal treatment of syphilitic infection is an important factor in prevention of the congenital form of this disease."

Protect Eyes Against Infection.—Not all serious eye accidents occur among careless children or thoughtless workmen; recently a technician at the National Institute of Health, Miss A. M. Pabst, while injecting meningitis culture into an experimental animal, accidentally squirted some of the culture into her own eye. The danger was immediately realized, and every effort exerted to cleanse the eye before the infection spread further, but without avail. This gifted bacteriologist died of meningitis ten days later. From a hospital comes the story of a surgeon who was operating on a patient with a lung abscess. A droplet of the infected matter hit his eye, and because he could not stop the operation to have medication applied, the eye became seriously affected, and only nar-

rowly escaped destruction. The surgeon states: "I was not wearing glasses or protective goggles at the time and did not stop the operation immediately to allow any medication to be put in my eye. The lesson to be learned here is identical with industrial hazards: if glasses or goggles are worn and immediate medication dropped into the eye, practically all eye infections could be eliminated." The editorial of the January *Safety Engineering* comments: "Medical, surgical, and bacteriological associations can perform a valuable service to their members by furthering the cause of infection prevention through pointing out the need for eye protection when the eyes are exposed to dangers."

Cod-Liver Oil Cures as Well as Prevents.—Cod-liver oil, which is a rich source of vitamin A, the eye vitamin, has proven to be an effective treatment for certain eye diseases, according to a communication in the *Lancet* for December 14 from Dr. Edgar Stevenson of Liverpool. Local applications of cod-liver oil were effective in treating a burn of the eyeball, and encouraged by the success in cases of burns, Dr. Stevenson used frequent applications of cod-liver oil on the eyes of a child having a stubborn case of chronic ulceration of the cornea. The case, which had persisted for 12 months, cleared up in four days with the cod-liver oil treatment. Other eye disorders on which the treatment was effective were chronic keratitis, ulcers caused by foreign bodies, phlyctenular conditions, and corneal roughness and superficial ulceration of trachoma.

Syphilis Clinic Opened at Perkins.—A clinic for the treatment of children with congenital syphilis has been opened in the past year at Perkins Institution and Massachusetts School for the Blind. In the past, fear had been felt that children with congenital lues could not be admitted to the school for fear that their condition was infectious; it has been discovered that when such children are under treatment, their condition ceases to be contagious. By providing treatment at the School, further progress of the disease is checked, and the children are permitted to gain the advantages of education suited to their handicap far earlier than might otherwise be the case.

National Society Notes.—Mr. Lewis H. Carris, managing director, has returned from an extensive field trip through Texas, New Mexico, Arizona, California, Colorado and Louisiana. Intensive work in California—in Los Angeles, San Francisco, Fresno and Sacramento—has stimulated prevention of blindness programs and awareness among physicians, ophthalmologists, business men, and educators in that state.

Mrs. Winifred Hathaway, associate director, attended the Farm and Home Week in Ithaca, under the auspices of the New York State College of Home Economics, where she lectured to lay groups on the prevention of eyestrain in the home and school and on lighting for health. An exhibit of the Society's posters and publications was a feature of the Week. Mrs. Hathaway and Dr. Anette M. Phelan, staff associate in education, represented the Society at the annual meeting of the National Education Association in St. Louis. At the same time, Mrs. Hathaway visited Joplin and Springfield, Missouri, under the auspices of the Missouri Commission for the Blind, addressing teachers on school problems and the conservation of sight.

Mrs. Eleanor Brown Merrill, associate director, and Miss C. Edith Kerby, statistician, attended a meeting in Washington of the Social Security Board, to discuss the measures to be incorporated in providing funds for the medical care of the blind.

The Society co-operated in the seventh annual Greater New York Safety Conference, where an exhibit of posters and continuous showing of the film, "Preventing Blindness and Saving Sight," attracted attention. The Society is happy to announce that Mr. G. E. Sanford, safety director of the General Electric Company has accepted an invitation to serve on the Society's Advisory Committee on Industrial Eye Hazards.

Current Articles of Interest

The Relation of Vitamin A to Anophthalmos in Pigs, Fred Hale, *American Journal of Ophthalmology*, December, 1935, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. Four litters of pigs, whose mothers had been deprived of vitamin A before and during gestation, were born blind. While it is not possible for a human mother to be so completely deprived of the vitamin A factor, even in a restricted diet, the author offers the suggestion that many of the eye weaknesses that we suffer may be due to maternal deficiency of vitamin A; in any case, concludes the author, it is obvious that until we have evidence to the contrary, we should insist on an abundance of vitamin A in the diet of the expectant mother in the early stages of pregnancy when so many of the vital organs are being formed.

If Your Child Has Headaches, Edwin F. Patton, M.D., *Parents' Magazine*, December, 1935, published monthly by the Parents' Publishing Association, Inc., New York, N. Y. "Don't accept a headache lightly as something to be endured, but make every effort to discover its cause—and then eliminate it," the author advises. He suggests a near as well as distance reading test to eliminate the possibility of farsightedness or astigmatism being the cause of chronic headache. "Every child with headache should be given the benefit of a thorough test of vision, under drops, by a competent specialist," says this physician. Other common causes of headaches lie in poor hygienic living; remoter causes of headache are also discussed.

The Lysozyme Content of Tears, William M. James, M.D., *American Journal of Ophthalmology*, December, 1935, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. Analysis of the tears collected from a hundred normal eyes shows that tears contain a powerful bacteriolytic and bacteriostatic action against the invasion of the tissues by bacteria. The majority of air-borne organisms are completely lysed by tears; . . . the

profuse lacrimation which follows the instillation of two per cent silver nitrate in the eyes of the newborn probably contributes to the effectiveness of the Credé technique. . . . The fall in the lysozyme content of tears with continued epiphora, with vitamin deficiency, and with corneal lesions, indicates that if the eye is to be protected, the cause of the epiphora should be removed, a diet adequate in vitamins maintained, and the normal flow of tears and the mechanical action of the lids not inhibited.

Glaucoma, with Special Reference to Medical Aspects and Early Diagnosis, H. M. Traquair, M.D., *British Medical Journal*, November 16, 1935, published weekly by the British Medical Association, London, England. Primary glaucoma is a disease of unknown origin mostly affecting elderly people of nervous temperament. It is essentially a disease of the patient rather than of the eye. The author concludes that glaucoma is to be diagnosed by the clinical picture as a whole, not by any one sign. The only pathognomonic sign is increased tension, and this is not always elicited.

Trend in Number and Severity of Eye Injuries, Division of Statistics and Information, *Industrial Bulletin*, November, 1935, published monthly by the State of New York, Department of Labor, Albany, N. Y. Eye injuries have been chosen as the first of a series of studies in frequency and severity of different kinds of industrial injuries because they have always been among the most serious, both in cost to the employer and in handicapping the workman in his future work. Because of their seriousness, eye accidents have received considerable attention, with the result that this group of industrial injuries has shown a greater reduction in number than any other. As far as it is possible to judge from the figures that are available, the percentage reduction in number of eye injuries is also greater than the decrease in employment. It is interesting to note, in practical terms, the decrease in the cost of a closed, eye accident compensation case from $593, in the interval 1925–1930, to $580 in the 1931–1935 interval; cost of compensation in other cases, in the same period, rose from $304 to $316. The total cost of closed eye accident compensation cases has fallen

nearly a million dollars since 1930: in that year, $1,933,134 was paid in eye compensation cases, while in 1934, only $954,239 was paid for the same cause. The Department of Statistics and Information, in retailing this information, adds that the use of goggles, when operating such machines as abrasive wheels, better safety measures, and education in accident prevention have been successful in reducing costly injuries in factories.

The Diagnosis and Treatment of Trachoma, Everett L. Goar, M.D., *Texas State Journal of Medicine*, December, 1935, published monthly by the State Medical Association of Texas, Fort Worth, Texas. The author calls attention to the differentiation between folliculosis and trachoma in protest against excluding children with folliculosis from school over indeterminate periods. During fifteen years of careful observation, the author has come to the conclusion that there is practically no trachoma among the school children of his city (Houston), and only five cases of trachoma in children were seen in that time, three of whom were from out of the city.

Phlyctenular Disease and Vitamin Deficiency, Leonard G. Redding, M.D., *Pennsylvania Medical Journal*, December, 1935, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. The author states that phlyctenular disease is not an entity, but a local manifestation of a general condition. The great fall in the incidence of phlyctenular disease is attributed to the increased emphasis placed upon vitamins in the diet of American children. It is of interest to note that not until the early years of the past decade were fresh green leafy vegetables available the year round for the average consumer, and coincident with the rise in consumption of green vegetables there has been a sharp decline in the incidence of phlyctenular disease. The author believes that vitamin A deficiency is the cause of the disease, and that increase in the amount of cod-liver oil given serves to effect a rapid cure.

The Use of an Extract of Adrenal Cortex in Glaucoma, Alan C. Woods, M.D., *Archives of Ophthalmology*, December, 1935, published monthly by the American Medical Association, Chicago, Ill.

Widespread publicity given the claims for adrenal cortex extract as a cure for glaucoma led the author and his associates on the staff of the Wilmer Ophthalmological Institute to investigate and evaluate the theory. Twelve glaucomatous patients were given experimentally the adrenal cortex extract treatment, and the author concludes: "A study of the effect of the administration of adrenal cortex extract on the intra-ocular tension of patients with glaucoma and chemical analyses of the blood of such patients before and after the administration of adrenal cortex extract, together with what is known of the physiologic action of this substance, lend no support either in fact or fancy to the theory of the pathogenesis of glaucoma advanced or for the therapeutic use of this extract in glaucoma."

Technic of Orthoptic Training in Squint, Luther C. Peter, M.D., *Archives of Ophthalmology*, December, 1935, published monthly by the American Medical Association, Chicago, Ill. The essential phases of successful training are: correction of amblyopia at an early age; concentration with the synoptophore, which is an amplified amblyoscope; judicious use of surgical intervention when this step becomes necessary; enthusiasm in all details of the work and open and unbiased mental attitude as to the results. The author concludes optimistically that "What has been accomplished by some ophthalmologists who have worked long in this field is within the reach of all."

Book Reviews

GENERAL OPHTHALMOLOGY. S. A. Agatston, M.D. Privately printed by S. A. Agatston, 1934. 170 p.

The difficult task of condensing the essentials of ophthalmology into a book of one hundred and seventy small pages has been accomplished by Sigmund A. Agatston. The book is intended as a short treatise for students and practitioners.

The author's first chapter is concerned with the important problem of testing visual acuity and the causes of poor vision. He then considers diseases of the eyelids, prefacing the subject by a brief review of the anatomy of this part. These chapters are followed by those describing diseases of other parts of the eye, for example, the retina and optic nerve, and include the consideration of glaucoma, cataract, and detachment of the retina. The chapters devoted to the study of errors of refraction, the use of the ophthalmoscope and arteriosclerosis are particularly valuable.

Because the book is filled with statements founded on Dr. Agatston's own broad clinical experience and because he makes many valuable practical suggestions for treatment, it is especially useful for the student of ophthalmology who is unable to evaluate the numerous suggestions for treatment made in the more comprehensive books on ophthalmology.

The last chapter is devoted to the study of the retinal vessels in the evaluation of ophthalmoscopic findings and their relation to general as well as local disease. This chapter as well as many of the other parts of the book will be of interest to any ophthalmologist.

An excellent index and table of contents add to the value of the work.

CONRAD BERENS, M.D.

Briefer Comment

CONCOMITANT STRABISMUS. T. B. Travers. London: George Pulman and Sons, Ltd., 1936. 127 p. ill.

This study of the treatment of squint by various methods was an essay presented for the Gifford Edmonds Prize in Ophthal-

mology. The author compares the visual results obtained by various methods employed for the treatment of concomitant strabismus, and concludes that within certain limits, the orthoptic treatment may bring about successful results. Faced with a wide angle of squint, however, he would operate, without hope of training fusion. He suggests that the case records presented be accepted as a provisional guide until more figures are compared over a period of years.

CLEAR-TYPE READERS. Nos. 1 and 2. London: National Institute for the Blind, 1935. 30 and 32 p.

The first two books in large type to be published in England were printed expressly for the use of local education authorities, in accordance with the recommendations of the Board of Education Committee of Inquiry into Problems Relating to Partially Sighted Children. The first book, printed in 24 point type, is a passage from Richard Jeffries' *Wood Magic:* the second, containing excerpts from Stevenson's *Night Among the Pines;* Brontë's *School at Lowood;* and Jerome's *Packing*, is printed in 18 point type. The material is carefully edited, and comment and exercises add to its usefulness in classroom work.

ALL THE CHILDREN. Thirty-seventh Annual Report of the Superintendent of Schools, City of New York, School Year 1934–1935. New York: Board of Education, 1935. 133 p.

Departing sharply from the stylized conventional school board report, the Superintendent of Schools has presented a stirring and comprehensive picture of the high spots of New York's 1,121,000 school population and its problems. The book with a large attractive format, fully illustrated by many photographs of the schools in action, covers such topics as special classes for the handicapped; individualization of education; extra-curricular activities and vocational counseling. Adopting a tabloid technique, the report's headlines and pictures bring alive the activities of the school in terms of individual children.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

190. Eye Openers, Emanuel Krimsky, M.D. 12 p. 10 cts.

Every doctor will recognize in this article questions which have been presented to him by patients in the course of his medical experience, and patients will find the answer to many of the questions that they have not had time to ask.

191. Illumination Intensities for Reading, Miles A. Tinker, Ph.D. 8 p. 10 cts.

This is the second of a series of articles on illumination designed to meet the inquiries of ophthalmologists, school officials, business and factory directors, and parents.

192. Heredity in Relation to the Eye, Prof. H. Lauber. 4 p. 5 cts.

The eye may be considered one of the best sites in which to study transmission of anatomical structure, physiology, and pathology from generation to generation.

193. Squints and Squint Training, James H. Allen, M.D. 12 p. 10 cts.

To correct cross-eyes, treatment must be begun early and followed consistently.

194. Eye Health Primer for Nurses, Francia Baird Crocker, R.N. 16 p. 15 cts.

An outline on eye health for the guidance of nurses—whether school, public health, private duty or hospital nurses.

195. A Sight Conservation Program in School, Edythe P. Hershey, M.D. 8 p. 10 cts.

An exposition of the methods used by the Dallas, Texas, Board of Education in carrying out its sight conservation program in the schools.

196. Eyes Right, Josephine H. Kenyon, M.D. 8 p. 5 cts.

Advice to mothers and nurses on care of the eyes of the young infant and the small child.

D86. Room Design and Equipment Requirements for Sight-Saving Classes, Winifred Hathaway. Reprinted from the *American School and University*, 1936 edition. 8 p. ill. 10 cts.

Size, illumination, and equipment specifications are outlined for a sight-saving class.

D87. Syphilis in Pregnancy, Max J. Exner, M.D. Reprinted from the *Journal of the American Medical Association*, February 8, 1936. 12 p. 10 cts.

Answers to the questionnaire on examination of the blood of the expectant mother show that the need for the tests, while less emphatic among private patients, is none the less real.

Contributors to This Issue

Dr. Emanuel Krimsky specializes in practice of eye, ears, nose, and throat in Brooklyn.

Dr. Miles A. Tinker, assistant professor of psychology at the University of Minnesota, has taken a special interest in the problem of lighting in relation to reading.

Professor H. Lauber is an ophthalmologist practicing in Warsaw, Poland; because he was formerly an instructor in ophthalmology in Vienna, he has many friends among ophthalmologists in the United States who were at one time his pupils.

Dr. James H. Allen is a member of the department of ophthalmology, College of Medicine, State University of Iowa.

Mrs. Francia Baird Crocker, R.N., is associate for nursing activities of the National Society for the Prevention of Blindness.

Dr. Edythe P. Hershey is director of school health work of the Dallas public schools.

Dr. Conrad Berens, who has played the rôle of mentor and guide in many prevention of blindness projects, is well known to readers of the REVIEW.